

ASPECTS OF URBAN CAMBRIDGE

1976 EDITION

GEOGRAPHY
TEACHERS'
GROUP

CAMBRIDGE
CURRICULUM
DEVELOPMENT
CENTRE

C O N T E N T S

Introduction

Page 1

A. THE SITING AND GROWTH OF CAMBRIDGE.

1. Initial settlement in the area. 2
2. Anglo-Saxon settlement around Cambridge. 7
3. Growth of Cambridge up to 1800. 10
4. Growth of Cambridge since 1801. 16
5. Urban Land-Use Zones. 23

B. THE SPHERE OF INFLUENCE.

1. The Journey to Work. 27
2. Shopping Market Area. 49
3. Newspaper Circulation. 56

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ASPECTS OF URBAN CAMBRIDGE

This selection of exercises and simulations has been formulated for use with children in the lower part of a comprehensive school (years 2-3 of an 11-18 school). It is not intended to be a comprehensive unit concerned with all aspects of urban Cambridge; it is doubtful whether the sections can even be seen as one unit; there is obviously much scope for future work. What is presented here is merely an attempt to introduce certain basic concepts which can be illustrated from the urban field.

The selection of exercises was inspired by two factors; on the one hand, the remarkable neglect of urban geography in school and, on the other, the belief that the urban field presents us with an opportunity to teach material that is relevant to our pupils and very much part of their experiences.

The exercises fall into two distinct sections:

1. The siting and consequent growth of Cambridge - this unit makes use of an evolutionary approach to stress factors which have influenced the growth of the city, and introduces basic ideas concerning city shape (concentric; sectors), which are then developed in terms of present-day urban land use zones.
2. The second section revolves around certain key ideas associated with the concept of sphere of influence using material associated with the journey to work, newspaper circulation figures and shopping market areas.

Much of the information used to illustrate these ideas, although readily available, would take much of a hard pressed teacher's time to collect. It is hoped therefore that the ideas presented here serve only as examples of how this material may be used and will act as a base from which individuals may develop further work.

Much of this work would have been impossible without the co-operation and assistance of the following:

The staff of the City and the County Planning Offices in
Cambridge;

The City Surveyor's Department;
Pye of Cambridge Ltd.,
W.Eaden Lilley & Co.Ltd.;
Robert Sayle & Co.Ltd.;
The City Reference Library;
Cambridge Evening News.

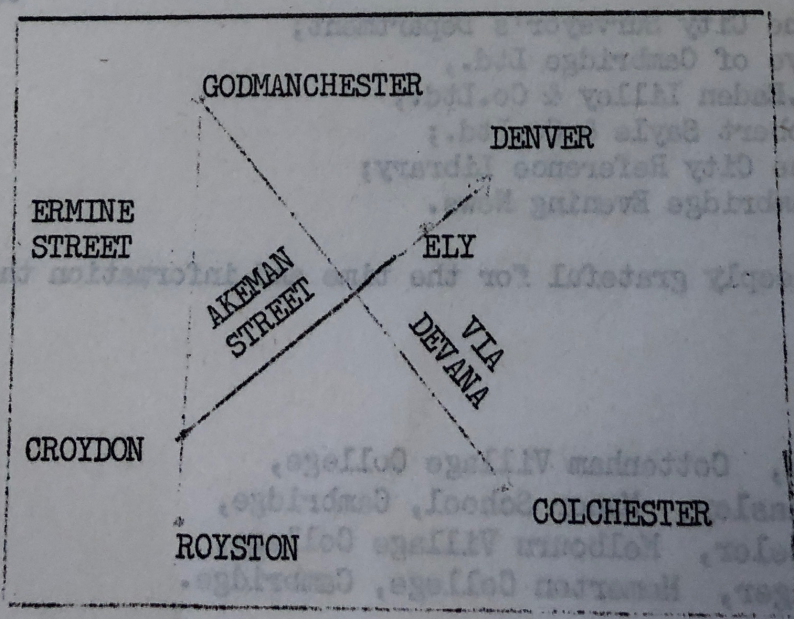
We are deeply grateful for the time and information they have given us.

Hugh Barr, Cottenham Village College,
Brian Greasley, Manor School, Cambridge,
Chris Wheeler, Melbourn Village College,
Mike Younger, Homerton College, Cambridge.

1. INITIAL SETTLEMENT IN THE AREA

Background information for the teacher

- i. This is an attempt to show the relationship between geology, technology and settlement patterns. Built into it is the later emphasis on communications and defence.
- ii. It is based very much on fact - there is local evidence of incursion of Belgae from the Low countries, a basically peaceful incursion of a people with primitive equipment who nevertheless practised a mixed farming.
e.g. Sites have been excavated at Hauxton, Grantchester and Linton; work at Wandlebury has suggested the presence of corn or hay-drying racks and a granary. Excavations on Castle Hill have revealed traces of a Belgic settlement on the edge of the Plateau overlooking the Cam.
- iii. The Cambridge bridgehead site was probably first developed by the Belgae, who settled along the edge of the river valleys on dry sites, along the Fen edge, and on the chalk and gravel juxtaposition. The heavier soils of the west have revealed little, and were probably not cleared; there was little movement west, but some North West, and some to S. Fenland, which was less inundated than later because of a lower sea level (hypothetical!).
Crossing points of the river were numerous above Cambridge, very rare and far between below.
- iv. The Romans stressed administration, hence town-building and road development. The Via Devana, mentioned in the game, entered Cambridgeshire around Horseheath following approximate line of existing A604, crossed the Cam near Magdalene Bridge, and continued along present Huntingdon Road to Godmanchester, and a link-up with Ermine Street. Akeman Street (not used in the game) runs from Ermine Street at Croydon, via Barton and Cambridge to Ely and Littleport.



- SETTLEMENT
- v. By second half of 1st century, Belgic occupation had been succeeded by a Roman settlement on Castle Hill. In the 2nd century, this had developed into a town with a grid plan, metalled streets and timbered houses, and possibly a fort.
 - vi. The Fens were not a negative area, but in the south an area of corn growing.
 - vii. It is reasonable to suppose that Anglo-Saxon sites' requirements were similar to the Belgae, so if a check is wanted on the villages in the Game, sections T1-3, the sites of Anglo-Saxon villages may be a useful guide - four probable settlements have been identified, on Castle Hill, at Barnwell (gravel/clay junction near river), and St. Bene't's Church, and at Newnham.
 - viii. If subsequent decline and development of the settlement is required, see "The Cambridge Region, p.166-8".

SETTLEMENT

Information Sheet for Pupils

In the last century B.C., groups of Belgae people, an Iron Age people, made their way from what is now Belgium and the Netherlands, northwards into South and East England. They came in small bands, usually peaceably, to a country which was very sparsely peopled, and where little land had yet been cleared for cultivation. Their tribal organisation was strong, so that their settlements were established as clusters of houses around which was found arable land. But their equipment was extremely primitive, and they could not cope with areas of heavy soils, or with areas which were densely wooded.

You must try and imagine an England extremely different from the present day.

1. All land near rivers was liable to flood in winter, and frequently was marshy throughout the year, especially if it was below 25-ft. high.
2. Most of the clay lowlands were thickly forested, and very difficult indeed to clear or plough up.
3. The chalk downlands, and the areas of gravels, were more open country, with grass and shrubs, and could be cleared without too much trouble. The gravels also provided a reliable supply of drinking water from wells sunk to the clay below; the Belgae could not sink wells, however, that were much more than 30-ft. deep.

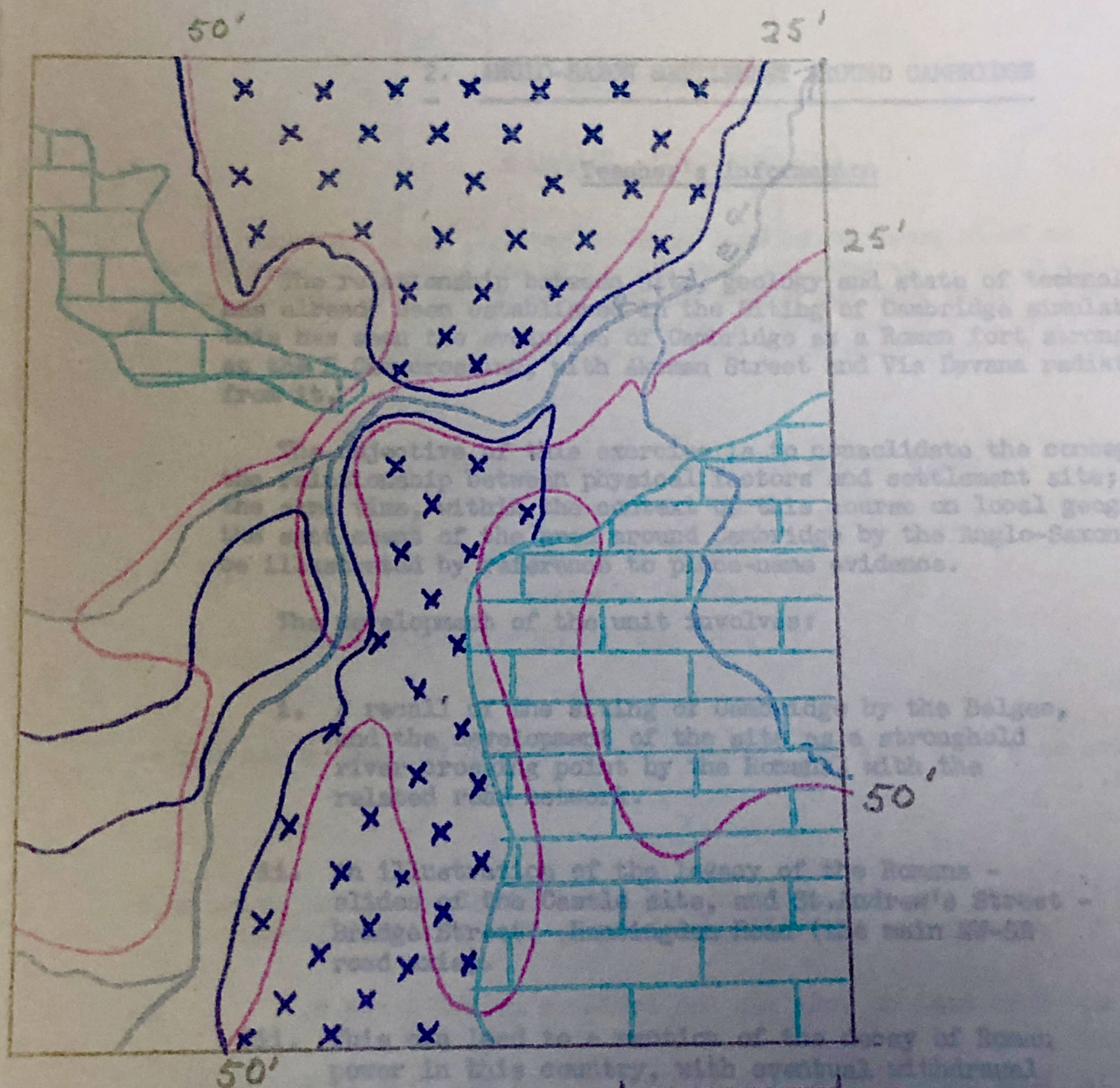
The settlers had several needs:

- a. Access to a constant supply of water.
Water could not be carried.
- b. Access to cultivatable land. Travel wasted work time.
- c. To avoid waterlogged ground. This was no use for crops or houses.
- d. Access to woods, for timber, which was used for buildings and fuel, and food for pigs (acorns, beech mast, etc.).

Now study the map of the area, in which we now live, as it was in 100 B.C. Remember the characteristics of each type of land given above, and the needs and abilities of the settlers. Each group of settlers needed land around the village for their needs, so villages were sited at least one mile apart, and in some cases, two miles from each other. The Belgae entered the area from the south east.

- T1. Consider the map and the information. After careful thought and discussion with your neighbour, mark on 5 SITES to the SE of the river, which might well have been chosen by the Belgae.
- T2. As the Belgae colonised this south eastern area, they would probably have been curious about the land on the other side of the river. Remember the dangers of flooding and all the marshy land. Eventually two groups of settlers crossed the river, and established small villages immediately on the opposite bank, Mark on what you think would be two possible crossing points, and the two new village sites.
- T3. After a time, the settlers began to spread out to the north and west. Mark on 4 more new sites.
- So the Belgae occupied and cultivated small areas of this land for about two hundred years. They were still living in their small settlements when the Romans began entering the country. The Romans were not agriculturalists, but administrators - they built towns, such as CAMULODUNUM (Colchester) and linked them with roads.
- A road crossed this area from Camulodunum, to join ERMINE STREET, the London-York road.
- T4. Remember that the same problems met the Romans as had met the Belgae two hundred years before.
- Draw in the route of VIA DEVANA, as it has been called, remembering:
- i. that Colchester is to the S.E. of this map;
 - ii. the need for the road to follow high ground;
 - iii. Ermine Street is to the West of this map;
 - iv. the river must be crossed;
 - v. the crossing place must be easily defensible, and preferably on high ground.
- T5. Mark in the site of a small Roman fort which would have grown up to defend the river crossing.

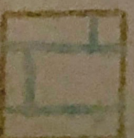
WHERE WOULD THE PEOPLE LIVE ?



CLAY AND
ALLUVIUM



GRAVELS



CHALK

2. ANGLO-SAXON SETTLEMENT AROUND CAMBRIDGE

Teacher's Information

The relationship between site, geology and state of technology has already been established in the Siting of Cambridge simulation; this has seen the evolution of Cambridge as a Roman fort stronghold, at the R.Cam crossing, with Akeman Street and Via Devana radiating from it.

The objective of this exercise is to consolidate the concept of the relationship between physical factors and settlement site; at the same time, within the context of this course on local geography, the settlement of the area around Cambridge by the Anglo-Saxons will be illustrated by reference to place-name evidence.

The development of the unit involves:

- i. A recall of the siting of Cambridge by the Belgae, and the development of the site as a stronghold river crossing point by the Romans, with the related road network.
- ii. An illustration of the legacy of the Romans - slides of the Castle site, and St. Andrew's Street - Bridge Street - Huntingdon Road (the main NW-SE road axis).
- iii. This can lead to a mention of the decay of Roman power in this country, with eventual withdrawal of their legions around 400 A.D., and subsequent Anglo-Saxon settlement, after initial raiding, in the fifth century.
- iv. The exercise itself.

CLASS EXERCISECambridgeshire Villages

As Roman power in England began to decline, so a new group of settlers entered the country, from the south and east, from Germany and Denmark. These were the Angles and the Saxons, who were farming peoples. Around Cambridge we can trace settlements they founded by the names which they gave to the places where they lived. For instance,

names ending in ING = dwelling place

HAM = farm

TON or TUN = enclosure

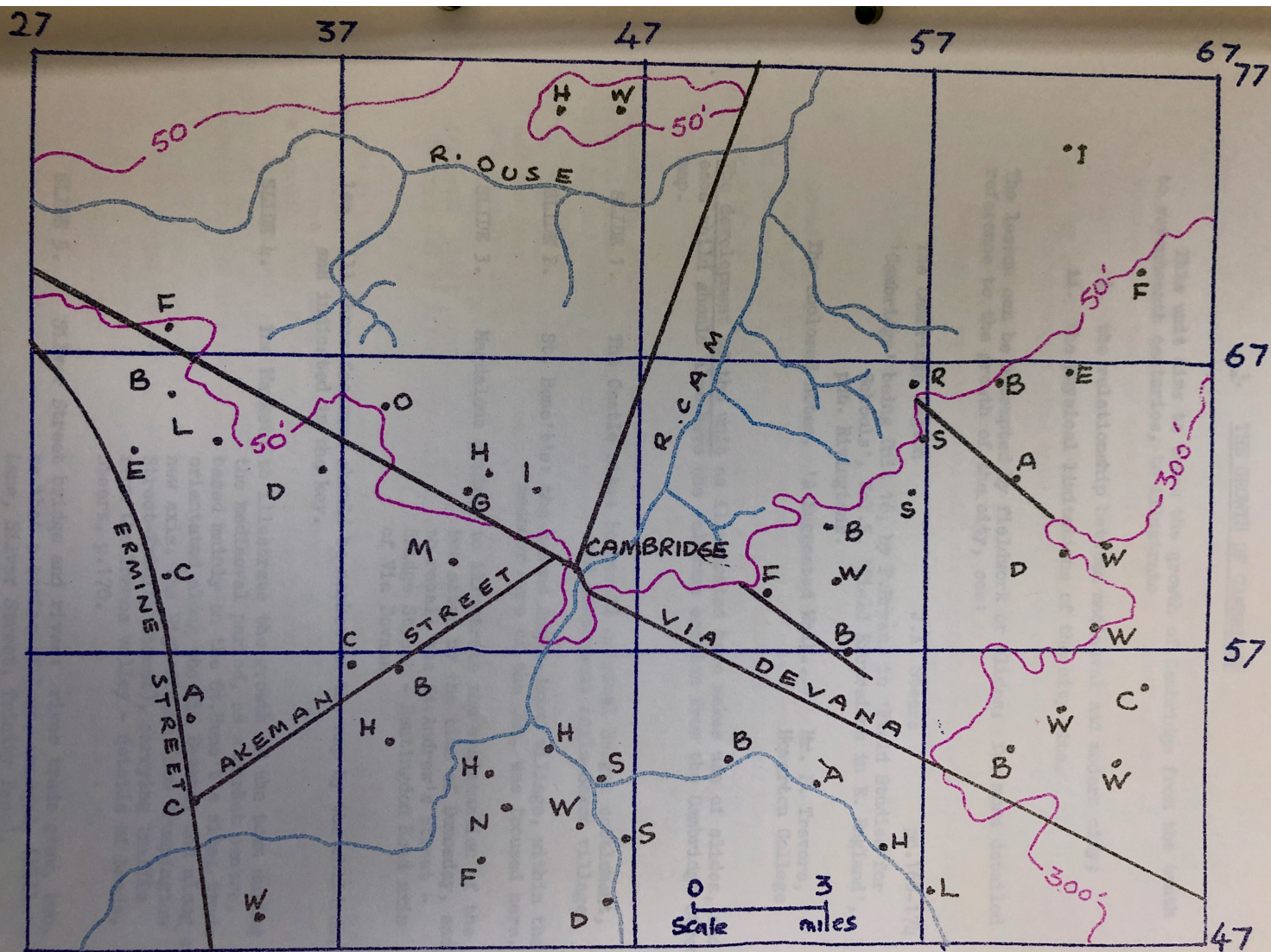
LEY = clearing

FORD and BRIDGE = modern meanings

all give us a hint that the villages may have been founded by the Anglo-Saxons.

1. Using the enclosed map, and the 1:50000 map of the area, mark on your map the villages shown by their initial letter.
2. Then name on your map the features marked A and B.
3. Look carefully at the 1:50000 map in the area to the north-east of Cambridge.
4. Try to explain why there is a line of villages along the 50' contour. (CLUE: look especially at the height of the land in the north, and the number of rivers in square 57/67E, 57/67N.) Finally, what do you think is the type of rock between Reach and Wood Ditton?

So the Anglo-Saxons colonised the countryside around Cambridge in the fifth to seventh centuries. What happened in Cambridge itself is hard to discover, but it seems that there were possibly four small settlements, at the Castle, around St. Bene't's, at Newnham and at Barnwell.



3. THE GROWTH OF CAMBRIDGE

This unit aims to trace the growth of Cambridge from the tenth to seventeenth centuries, to illustrate

- i. the relationship between mediaeval and modern city;
- ii. the physical limitations of the city site.

The lesson can be attempted by fieldwork or slides; for more detailed reference to the growth of the city, see:

The Cambridge Region

J.A. Steers

pp.168-174

'Cambridge' being Unit 16, by P.Bryan, in 'Field Studies for Schools', Vol.5, 'Field Excursions in E. England', pub. Rivingtons.

The enclosed notes, 'A Suggested Walk...'

Mr. P. Travers,
Homerton College.

The development of the unit as illustrated here makes use of slides, and each child should also have the relevant section from the Cambridge Street map.

SLIDE 1. The Castle site: to recall original Belgae settlement, and subsequent Anglo-Saxon village.

SLIDE 2. St. Bene't's: the second Anglo-Saxon village, within the meander core of the Cam, was focused here.

SLIDE 3. Magdalene Bridge: to illustrate the amalgamation of the two sites by the time of Domesday, and to recall the St. Andrew's Street - Bridge Street - Huntingdon Road axis of Via Devana.

1** All three features should be marked on the map by the children, and indicated in the key.

SLIDE 4. The Market: to illustrate the growth of the town during the mediaeval period, as a market centre, based mainly on the St. Bene't's site; trade orientated along the Via Devana, and along a new axis, the High Street (now Trumpington Street-Trinity Street), carrying traffic from the Thames valley - details of trade, Steers, p.170.

SLIDE 5. Silver Street bridge and river: river trade grew, too, so that a series of lanes emerged, (Mill Lane, Silver Street, Trinity Lane), connecting the river wharves with the High Street axis.

So by the end of the thirteenth century the town could be enclosed by a triangle, formed now by:

- i. Trinity Street, King's Parade, Trumpington Street up to Trumpington Gate, which stood near the corner of Pembroke Street and Trumpington Street.
- ii. Bridge Street, St. Andrew's Street, Regent Street, up to Barnwell Gate, where Petty Cury joins St. Andrew's Street.
- iii. The King's Ditch, an early defence work cut to guard the crossings of the Cam, which ran from the Mill Pool to Magdalene College, via Mill Lane, Pembroke Street and Hobson Street.

2** The outline of thirteenth century Cambridge can now be coloured on the base map.

By the end of the thirteenth century, Cambridge had become a busy market town, created by road and river traffic; the Castle, on the old fort site, built on an artificial mound by the Normans, had recently been rebuilt, and most of the area within the triangle was built up.

SLIDE 6. Clare College, 1338.

SLIDE 7. Caius College, 1347. The town's importance was greatly increased by the coming of the University, whose origins, nevertheless, are obscure; the area within the triangle was already built up, so the colleges were forced to build on the outskirts, on ground artificially raised above the flood level, between the High Street and the river. This was the siting of a line of colleges from St. John's, 1511, to St. Catharine's, 1473; other colleges, e.g. Christ's, 1448, Jesus, 1496, Emmanuel, 1584, Sidney Sussex, 1594, were built to the east of the existing town.

SLIDE 8. The Backs. So a University quarter was added to the town, encircling the town to east and west; between 1400 and 1800, the town grew little in area; the centre became more overcrowded and congested, more colleges were founded on previously monastic sites, some colleges acquired water meadows along the river to bring the Backs into existence - but generally the town did not physically expand.

3** The College areas can be added to the map and key

CAMBRIDGE:

A suggested walk round the town to demonstrate the main features of the plan of Cambridge in relation to the physical geography of the site and the historical development of the town and University.

(Peter Travers, Homerton College, Cambridge).

TRUMPINGTON STREET.

Trumpington Gate, the southern entrance to the town stood near the corner of Pembroke Street and Trumpington Street, where the London road crossed the King's Ditch. St. Mary the Less (formerly St. Peter's) thus stood outside the gate, probably pre-Conquest in foundation, built in the fourteenth century.

The King's Ditch, an early defence work probably cut to guard the crossings of the Cam, approximately bounded the town on south and east and ran from the Mill Pool along the present Mill Lane, Pembroke Street, St. Tibb's Row, Hobson Street to the river again opposite Magdalene College.

Mill Lane, Silver Street, King's Lane, Trinity Lane are modern survivals of old lanes running from the High Street (Milne Street) to the Mill Pool, the crossings of the Cam at the 'Small Bridges' and the river hithes.

Bene't Street (reached via Corpus Christi - via the Old Court, fourteenth century - the first closed quadrangle in Cambridge colleges but in fact built c.300 years after St. Bene't's tower).

St. Bene't's Church - the oldest building in Cambridge - late Saxon work is seen in tower (long and short work) and inside, in the arch between tower and nave.

The Eagle Inn, seen through an arch on the north side of the street still shows something of the plan of the mediaeval inns of the town. The inns often had an entrance from one street to a narrow court surrounded by a galleried building and behind, a stable yard with an exit to another street. Many have left their mark as 'passages' today, (St. Edward's Passage, Three Tuns Inn, Peas Hill: Rose Crescent, Rose and Crown Inn; Market Passage, Black Bear Inn, Market Hill; Falcon Yard, Falcon Inn, Petty Cury).

Peas Hill - the site of the old fish market; Wheeler Street to Corn Exchange Street, originally Slaughter Lane, leading to the beast market on St. Andrew's Hill. Guildhall Street, originally Butcher's Row, was part of the general market.

Market Hill - the garden market and general market is still held on this old market site. By sixteenth century much of Market Hill covered by streets of small houses which were only cleared away in the mid-nineteenth century after a fire in 1849.

N.B. On east side of Market Hill, a number of fine seventeenth and eighteenth century houses, especially one with fine shell hood and wrought iron balcony.

Petty Cury. The name, Parva Cokerie (Little Cook's Row) perhaps indicates part of Market Hill. The old houses and shops have disappeared to make way for the Lion Yard redevelopment.

St. Andrew's Street: Barnwell Gate stood where Petty Cury joins St. Andrew's Street where the road from Colchester (Via Devana) crossed the King's Ditch and entered the town. The Church of St. Andrew the Great from twelfth century and perhaps earlier served a parish outside the gate comparative in situation to St. Peter's outside Trumpington Gate. Present Church of St. Andrew the Great built 1842.

SIDNEY STREET: BRIDGE STREET.

This street, which leads from Colchester to the main ford of the Cam, formed with the old High Street (Trumpington Street, King's Parade, Trinity Street and St. John's Street) the essential framework of the old town plan. The route from Newmarket and Bury St. Edmunds comes in from the east along the northern edge of the Barnwell terrace (Newmarket Road, Jesus Lane). Jesus Lane and St. John's Street came into Bridge Street on the edge of the early built up area south of the river; St. John's Hospital was built on waste ground about 1200; All Saints' Church (removed in nineteenth century from site on All Saints' Passage to present site in Jesus Lane) was All Saints in the Jewry, and the Jewry usually a "suburb" and the hay market was held near St. Clement's Church.

Church of the Holy Sepulchre, one of four 'round' churches in England. It was built 1120-40 on site of earlier church and has been much restored at various times.

Church of St. Clement has a late twelfth century or early thirteenth century nave. It may also stand on site of earlier church bearing witness to the importance of the Danish traders as St. Clement was a favourite saint.

Magdalene Bridge. The ford was early spanned by a wooden bridge. The first stone bridge was built by Essex in 1724 and replaced by an iron bridge in 1823. The old hithes probably lay along both banks of the river at this point.

CASTLE STREET.

Castle Street (and Northampton Street) perhaps now give the best idea of the houses and shops of the old town. Lath and plaster work, common brick much used from the sixteenth century; heavily timbered houses rare, reflecting the shortage of big wood locally, seventeenth and eighteenth century houses.

Magdalene College on the site of hostel for Benedictine monks, only college north of river. Pepysian library (late seventeenth century - books transferred by Pepys's will in 1724).

Northampton Street - Chesterton Lane. Cross-route at the foot of Castle Hill runs eastward, using spread of river gravels of Intermediate Terrace as causeway, to the Jurassic island of Ely and westward, using chalk outliers of Madingley Hill as stepping stone across vale, to St. Neots and the Midlands.

Church of St. Giles, built in 1875, on site of ancient church preserves in the south aisle, Norman or late pre-Norman chancel arch. (1050-75? or c.1200).

Church of St. Giles - rebuilt in 1781, has remnants of the old church (S. door early thirteenth century; West tower flintwork fourteenth century).

Castle Hill - on artificial conical mound, to the east of Castle Street. From the summit an excellent view of the town. The Romans occupied the position, the Anglo-Saxons may have fortified it against the Danes, the Normans built a castle and earthworks here in 1086, mostly disappeared in seventeenth century. (Shire Hall twentieth century reflects administrative importance of Cambridge.)

Junction of Castle Street, Huntingdon Road and Histon Road marks the approximate limit of the mediaeval town.

Mount Pleasant, Albion Row, Shelley Row. These little streets run along artificial scarps, parts of the castle ramparts.

Pound Hill - the site of the beast market from 1842-85, after the site on St. Andrew's Hill had become too cramped and before the railway made the present site (the corner of Cherry Hinton Road and Hills Road) a convenient one. The old pound for Cambridge Fields was also nearby.

The School of Pythagoras (at the back of large yard, almost opposite Pound Hill, off Northampton Street). Late twelfth century, probably the country house of a Norman gentleman - of clunch rubble with facings.

QUEEN'S ROAD - ST. JOHN'S BACKS - TRINITY COLLEGE.

This section of the walk and on to Queens' College gives a good idea of the position of the colleges between the old High Street and the river, often on 'made' ground, raised above flood level; also of the run of Milne Street and the situation of the river hithes. The University Library, the new buildings of Clare, Selwyn, Newnham Colleges and Ridley Hall, the houses of Grange Road, West Road and Sidgwick Avenue are on the intermediate gravel terrace west of the river, and on the site of the Cambridge Fields, the three western open fields of the town.

Trinity Great Court. N.B. fountain, built 1602, rebuilt 1716, supplied with water from Madingley Hill, originally laid out along a conduit by the Franciscans in 1325-7.

Trinity Street, (part of old 'High Street') - notice Turk's Head Coffee House, now Matthew's Cafe - sixteenth to seventeenth century with pargetting, also some good Georgian houses.

Trinity Lane - Trinity Hall. N.B. Library - Flemish stepped gable sixteenth century with chained books.

CLARE COLLEGE, KING'S COLLEGE, QUEENS' LANE (Milne Street), QUEENS' COLLEGE.

N.B. Principal Court fifteenth century - brick-faced over clunch core, Cloister Court fifteenth century - half timbering. Via Anchor Lane and Mill Pool to Coe Fen and Sheep's Green.

At Mill Pool Bridge note site of King's Mill and Bishop's Mill, two mills mentioned in Domesday Book. Notice also Newnham Mill and artificial diversion of river to provide head of water to drive wheel.

Sheep's Green and Coe Fen were partially drained in the nineteenth century, originally fenny commons and still common land. N.B. Engineering Laboratories required deep piles for foundation on river alluvium.

FEN CAUSEWAY - TRUMPINGTON ROAD - LENSFIELD ROAD.

Hobson's Brook, an artificial channel which brings water along the course of the former bed of the River Cam from Nine Wells at Shelford.

Hobson's Conduit, at corner of Lensfield Road, stood in the market place 1614-1855. (Present water supply from Cherry Hinton first brought to Cambridge in 1853). The conduit - late Jacobean work.

Trumpington Road which brings the route from London to the Cambridge crossing along the dry gravel beds between the old and new river beds.

TENNIS COURT ROAD - DOWNING COLLEGE.

Downing site lies across the central depression in the gravels which may mark the old river channel and lay until nineteenth century as open rather marshy land between Trumpington Street and Regent Street.

Regent Street as Hadstock Way in old maps (from Hadstock, the village where a route along Granta Valley to Colchester climbs the scarp of the upper chalk) approaches the Cambridge crossing along the intermediate gravels east of the central depression of the old channel.

FENNER'S, DONKEY COMMON, PARKER'S PIECE, CHRIST'S PIECES, MIDSUMMER COMMON.

All these approximately coincide with a narrow strip of gault which outcrops between the intermediate gravels of the river bend and the Mill Road on the Barnwell Terrace, mean streets of small houses have been tightly packed in the nineteenth century on the site of Barnwell Field, the three eastern open fields of the town.

CHRIST'S COLLEGE, EMMANUEL COLLEGE.

These colleges occupy good gravel sites, east of the central depression, outside Barnwell Gate on the edge of the mediaeval town, a position comparable to that of Peterhouse and Pembroke west of the central depression and outside Trumpington Gate.

DOWNING STREET - PEMBROKE STREET.

The laboratories on north side of Downing Street are nineteenth and twentieth century in date; they occupy the lower ground between St. Andrew's Hill and the Market Hill which may mark the earlier channel of the Cam. The land was originally the garden of the Austin Friary in Bene't Street and was used as a Botanic Garden 1760-1852.

The walk has compassed the town and university as it was until the middle of the nineteenth century. It is only recently that the lower ground between Trumpington Street and St. Andrew's Street has been built up and the houses spread so far east and west, north and south of the mediaeval bounds. The Backs and the Commons however to some extent still mark off the old town from its new suburbs.

For reference with these notes: Maps - Darby, P. 163, 165, 167.
1" geological maps
6" street map.

Some Interesting Architectural Features.

(See "City of Cambridge Historical Monuments", Vols. 1 and 2)

Senate House 1822	St. Botolph 14th cent.
University Observatory 1822	St. Edward 13th and 14th cent.
Christ's College 16th cent.	St. Mary the Great 1478-1519
Corpus Christi 14th cent.	St. Mary the Less 14th cent. and
Gonville & Caius 14th cent.	others mentioned in the
additions 1865	text.
King's College 15th and 16th cent.	No. 13 Trinity Street, late 18th
Magdalene College 15th cent.	cent., 19th cent. shop front.
Pembroke 14th cent., Chapel 17th cent.	Nos. 30 and 31 18th cent. incl.
Queens' College 15th cent.	shop front.
St. Catharine's 17th and 18th cent.	Nos. 4-6 to 22 King's Parade - good
Trinity College 16th and 17th cent.	Nos. 6-9 Bene't Street - all at one
Trinity Hall 14th cent.	time part of Eagle Inn.
Sidney Sussex 16th cent.	Central Hotel - Peas Hill - 17th
Peterhouse 13th cent.	cent.
Clare College 17th and 18th cent.	No. 5 Market Hill - 17th cent.
Little Trinity, Jesus Lane, fine	Rose Crescent - 19th cent.
18th cent.	15 and 16 Bridge Street) late med-
	4 and 4a Jordans Yard) iaeval
	town
	houses.
	25 and 25a Magdalene Street - 17th
	cent.
	Nos. 1-5 Bene't Place, fine early
	19th cent.

4. Teacher's Information Sheet for Exercise on Growth of Cambridge, 1801 - present.

The objectives of this exercise are twofold:

1. to involve the children in tracing the historical development of their own city;
2. to use the content of the growth of Cambridge to introduce ideas about urban morphology -
 - i. the concept of city shape, the concentric ring theory,
 - ii. the influence of transport lines, differential sector growth,
 - iii. the relationship between age of building and distance from the city centre.

The growth of the city can be traced as follows:

1. Expansion before the arrival of the railways, as a result of congestion within the old town. This congestion was sufficient to overcome resistance to the enclosure of the open fields - hence the enclosure of the Cambridge Fields, to the SW, in 1805, and the Barnwell Fields, in the east, 1811. Land was thus released for building, and the area between the two southern approach roads (now A10 and A604) was almost at once laid out as the New Town. At this time, too, the University acquired the Botanic Gardens.
2. The arrival of the railway, 1845; the railway company wanted a central position, but lack of firm and open land, and opposition from University interests and from river traders, led to isolated country site. It bridged the Cam to the E. of the historic crossing place, where river gravels came near to the river. The coming of the railway occasioned considerable industrial growth, and allied urban growth:
 - i. a maze of little streets developed between what are now Hills Road and Newmarket Road, on the edge of the old town - two main axes developed, Mill Road and East Road.
 - ii. Buildings moved out to the other side of the railway; Romsey Town grew between the railway and Coldham's Brook, avoiding the Gault Clay outcrop in the valley.
 - iii. Alongside railway, industrial concerns sought sites.
3. Nineteenth century expansion also took place in the north, where the enclosure of Chesterton Fields, 1840, led to the growth of New Chesterton between the old village and the Castle site.
4. Expansion in the west during the nineteenth century was slower, and buildings were of lower density; an area developed after the 1882 statute allowing University fellows to marry without relinquishing their posts.
5. Twentieth century expansion can be divided into pre-1939, 1939-61 and recent.

It should be appreciated that the concluding part of the exercise, the simulation aspect, is not designed to reproduce the exact shape of the city, but to highlight the various factors important in the expansion of the city, and to introduce certain very elementary ideas concerning city shape, i.e. concentric and sector. There is no 'right and 'wrong' answer; several final products are possible and meritworthy. The final question in the exercise leads on to the possibility of setting up a fieldwork exercise to test the hypothesis concerning age of building and distance from the city centre, and thereby to introduce other factors which need consideration such as urban renewal and the absorption of former villages.

We have seen that by 1400 the University was established, and Cambridge had become a market town serving the countryside round about; between then and 1800, it did not increase very much in area, although the centre became much more congested. Map 1 shows the area that the town occupied in 1801 - compare this with the map you drew last time, which was on a different scale. Map 1 also shows the areas of common land and University land around the town in that year, when 9,300 people lived in the town.

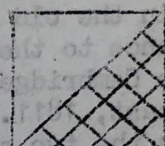
The exercise which follows shows how the city has grown between 1801 and the present day.

A You will see that nearly all the growth between 1801 and 1851 took place in the south. This was because congestion was so bad in the city itself, and living and working conditions so difficult, that the common fields on the edge of the city to the south had to be enclosed; then they were built upon.

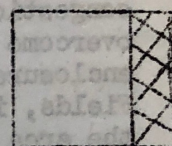
Ti. Count the number of squares covered by new growth in the period 1801-51; take



as $\frac{3}{4}$ square



as $\frac{2}{4}$ square



as $\frac{1}{4}$ square

1 square is equal to $\frac{1}{4}$ sq. mile in area, so work out how much land was covered by new building in this period. The population during this time rose from 9,300 to 26,500.

Tii. Colour in the area of city growth in this period, and add the colour to the key.

B In 1845, the railway arrived in Cambridge.

Tiii. What sort of factors would influence the route that the railway followed near and in the city?

In fact, the railway station was sited at X on Map 1, in the middle of the countryside.

Tiv. Mark the route followed by the railway by linking up points YXY on the map.

Tv. Why do you think that the railway followed the route which it did?

The railway brought great prosperity to Cambridge; many new industries grew up near it, relying upon the railway for the transport of goods and raw materials, and trade prospered. The population of the city grew rapidly, to 45,000 by 1901.

Tvi. This growth in population was so great that a large number of new houses were built in the period 1851-1901; these houses covered an area equal to 20 squares on your map.

a. part of this area (4 squares) was to the north of the river, between the old castle and Chesterton village, on formerly common land; this is marked 2 on your map - shade it in a different colour and add to your key.

b. 5 squares were occupied by houses which were constructed after 1882; these were mainly for University lecturers; look back to the map you used in the last exercise to see where the University is centred, and then mark on your map an area equal to 5 squares - colour it as in a. above.

c. This leaves 11 squares which were covered by new buildings in this period.

d. Think carefully about where these new buildings might be - remember one of the main reasons why the town grew so fast in this period; think where people might work and how they would get to work; think where they might shop.

Now colour in an area equal to 11 squares, where you think it is most likely that these new houses might have been built. Use the same colour as in a. and b. above.

Tvii. Compare your map with the map which you have just been given, Map II. Describe how the shape of the city in 1901 is different from the shape which Map II indicates.

Look also at the 1:50000 map of Cambridge. Can you explain the differences between your map and map II?

What general shape does the city remind you of?

So now we know what the shape of the city was in 1901, when its population was 45,000.

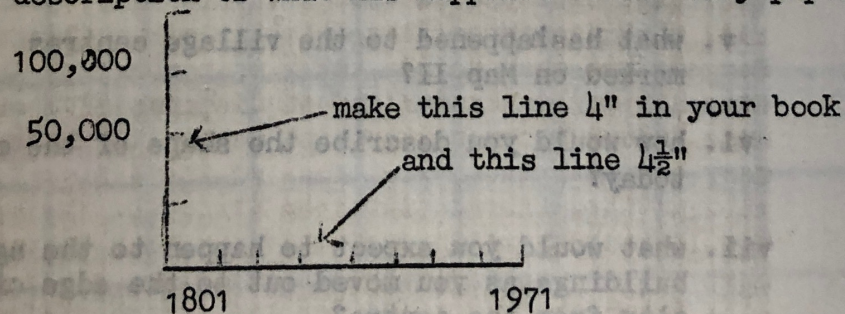
The growth of the city this century can be seen in one respect in the population figures.

1901, 45,000; 1921, 59,000; 1951, 90,000; 1961, 95,500; 1971, 98,800

The growth in the area of the city in terms of the squares shown on your map is as follows:

1901-21, 8 squares; 1921-39, 11 squares; 1939-61, 28 squares

t1. Use the graph frame to plot the growth of the population of the city between 1801 and 1971. Write a short description of what has happened to the city population.



So in seventy years the population of the city has more than doubled. Obviously much new housing has had to be provided. The city in these years did not spread out haphazardly; its shape is the result of a number of choices that people made. Some areas are more attractive to new housing than other areas.

t2. Study Map II carefully and then list:

i.2 factors which might discourage new housing from an area.

ii.3 factors which might encourage use of a site for new housing.

13.
t3. Remember your answers to your last question. Now study all the information given on map II. New housing can only be built within the city boundaries. Now add the following areas to map II, shading each in a different colour:

i. shade in an area equal to 8 squares to show city growth between 1901 and 1921; note that this area need not be 8 whole squares, but may include many small pieces from different squares - it must merely add up to 8 squares.

ii. shade in an area to show the growth of the city, 1921-39; 11 squares.

iii. shade in an area for city growth, 1939-61; 28 squares.

t4. Compare your completed Map II with Map III, which shows the area Cambridge covered in 1961. Try to describe the main differences between your map and Map III. It is not fair to say that your map is wrong if it is not the same as Map III, because an important factor is chance, and this is difficult to account for. For instance, one farmer near the city might not want to sell his land, so no new houses will be built there; the location of the Airport is also largely chance - we had taken no account of this; also, since 1950, some open land on the edge of the city has been made into a green belt, which means it cannot be built on very easily.

t5. Now look at Map III -

i. in which direction from the centre has most growth taken place?

ii. at what date do you think it was true to say that the city was circular in shape?

iii. would you describe the shape of the city today as circular (concentric)?

iv. if not, what has altered the shape of the city?

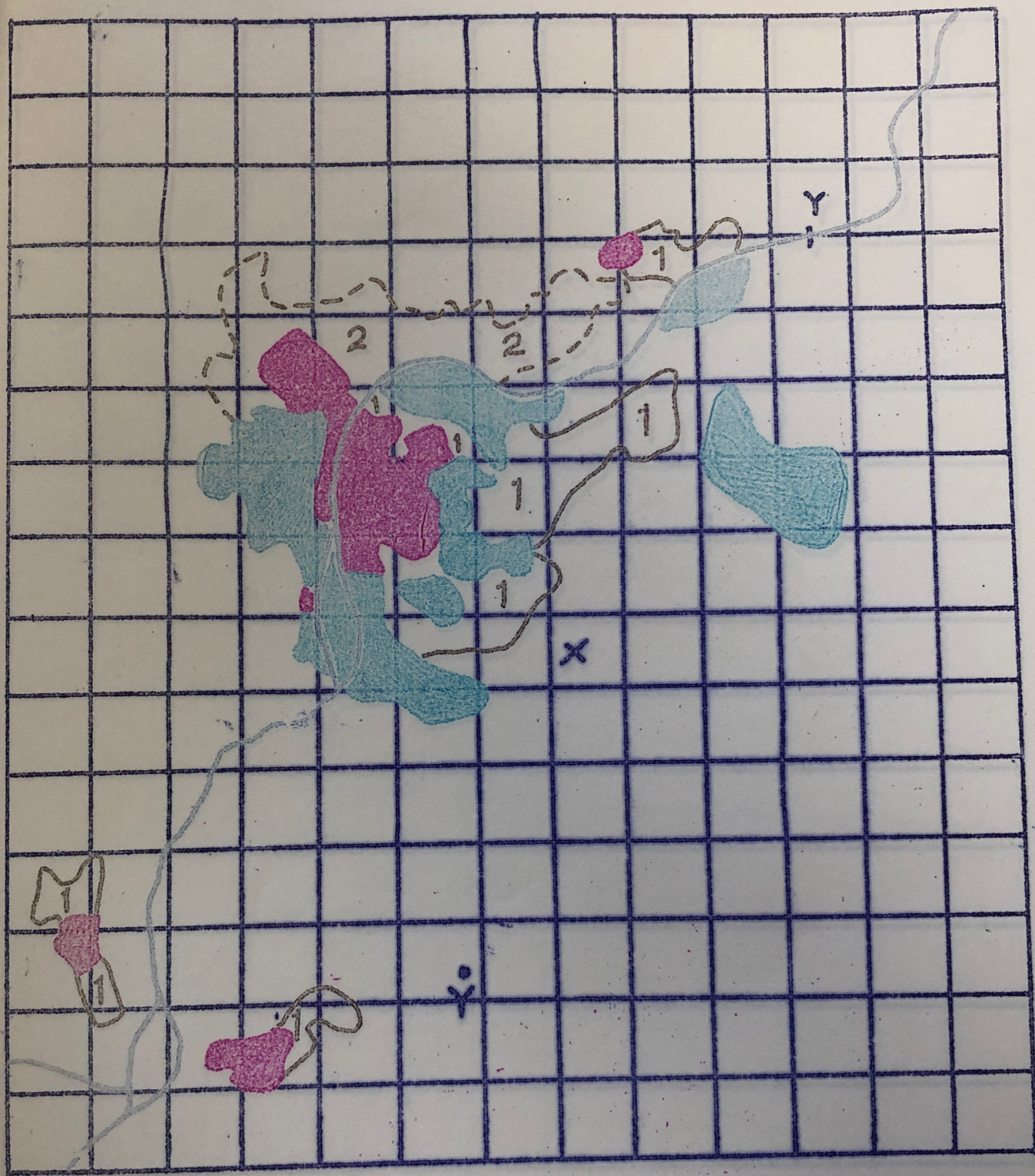
v. what has happened to the village centres marked on Map II?

vi. how would you describe the shape of the city today?

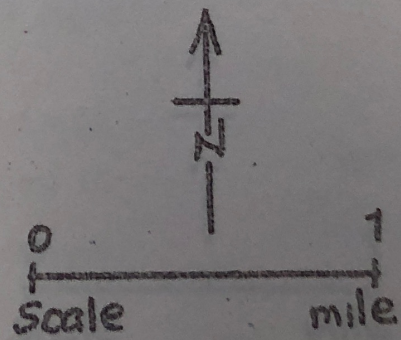
vii. what would you expect to happen to the age of buildings as you moved out to the edge of the city from the centre?

CAMBRIDGE 1801 - 1901

MAP 1

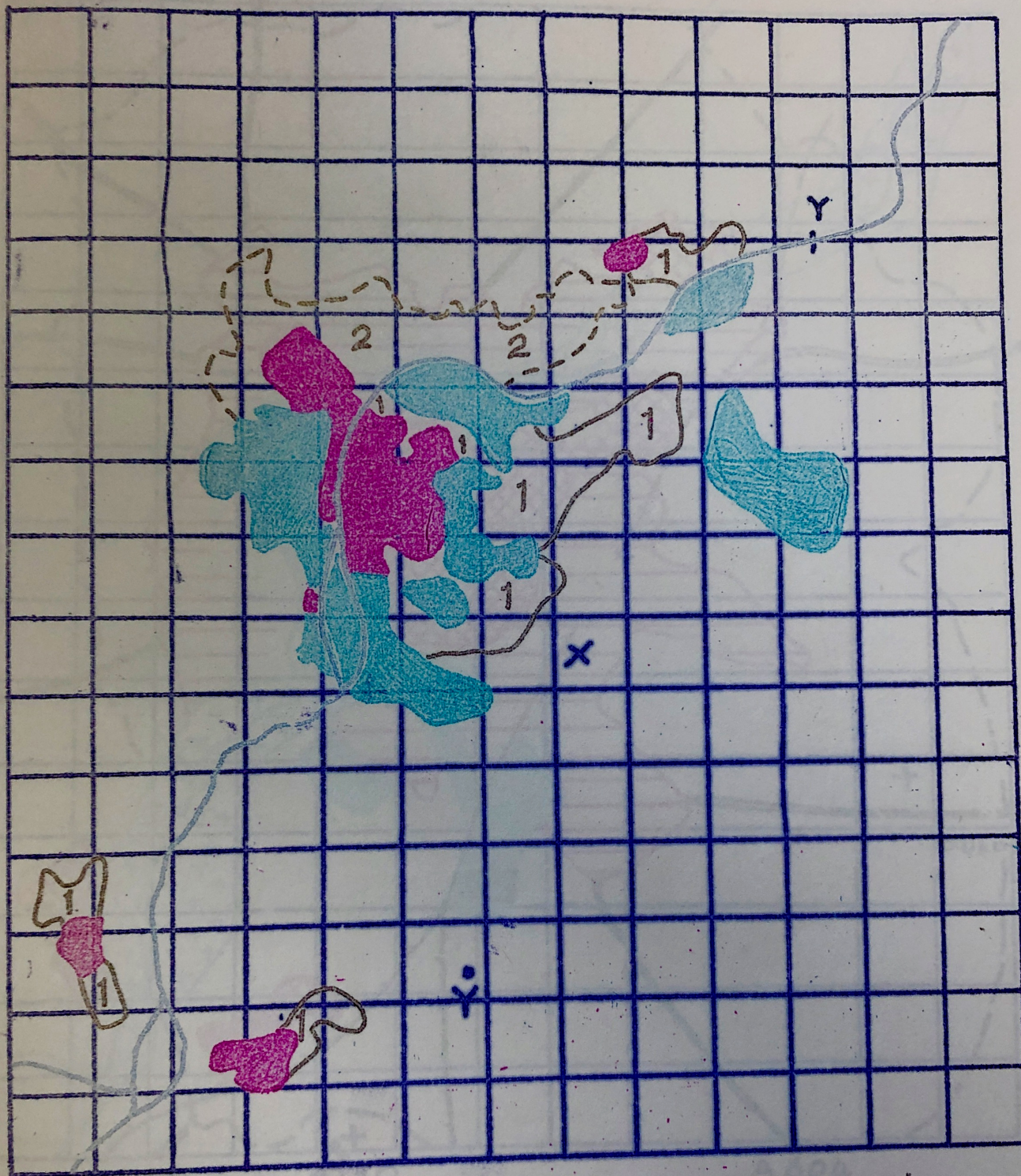


- GROWTH BEFORE 1800
- COMMON AND UNIVERSITY LAND
- 1 GROWTH 1800 - 1850
- 2 " 1851 - 1901

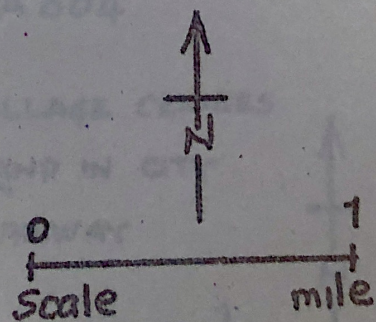


CAMBRIDGE 1801 - 1901

MAP 1

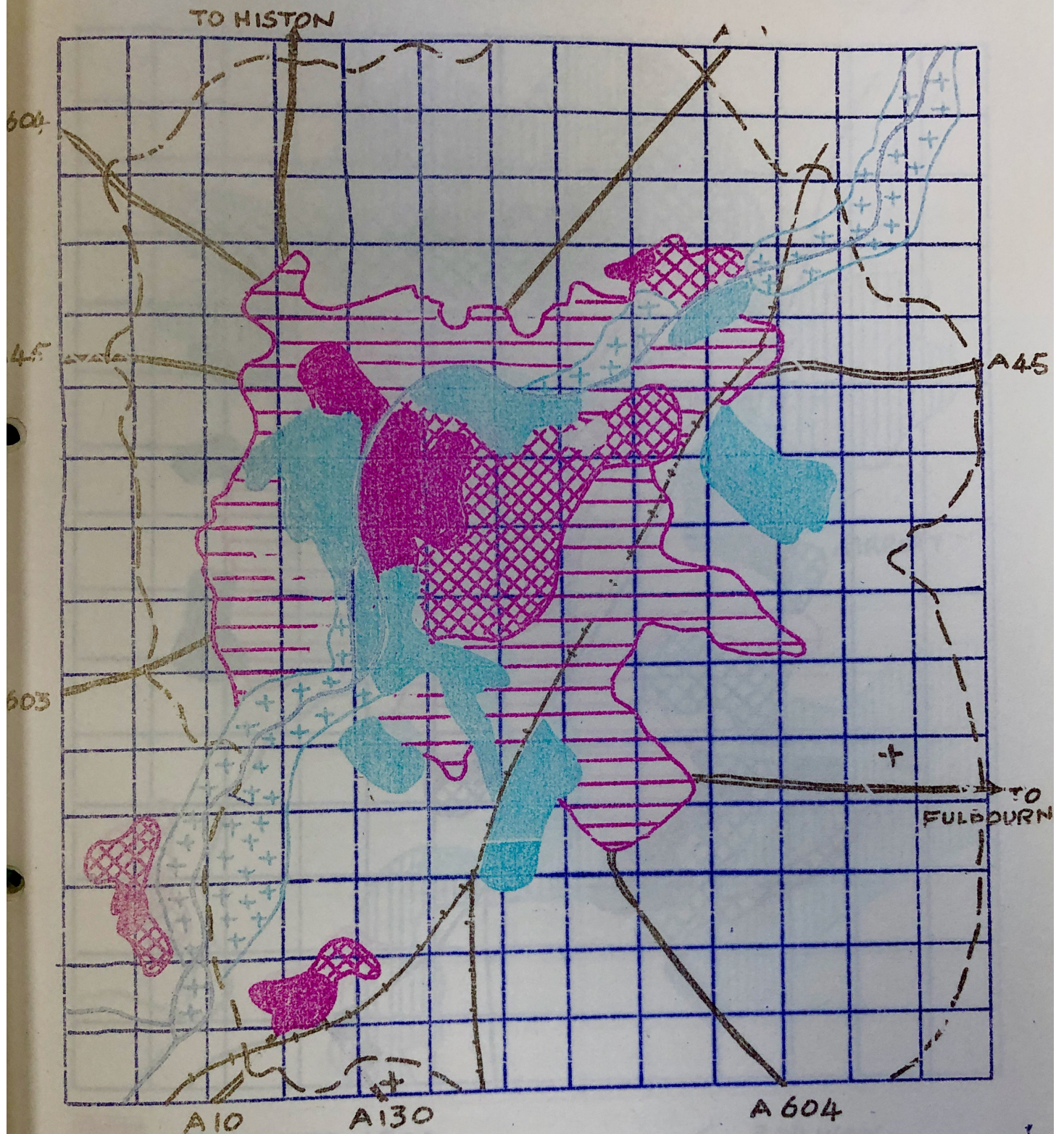


- GROWTH BEFORE 1800
- COMMON AND UNIVERSITY LAND
- 1 GROWTH 1800 - 1850
- 2 " 1851 - 1901



CAMBRIDGE 1901

MAP 2



- GROWTH TO 1800
- OPEN LAND, COMMONS, UNIVERSITY LAND
- GROWTH 1800-1850
- " 1851-1901
- LAND LIABLE TO FLOOD

- VILLAGE CENTRES
- LAND IN CITY
- +

+

+

+

 RAILWAY

0

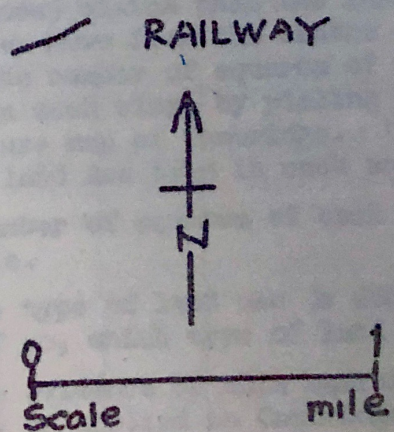
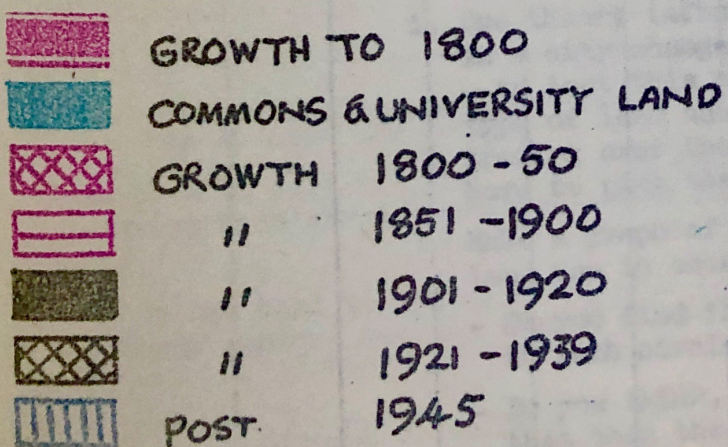
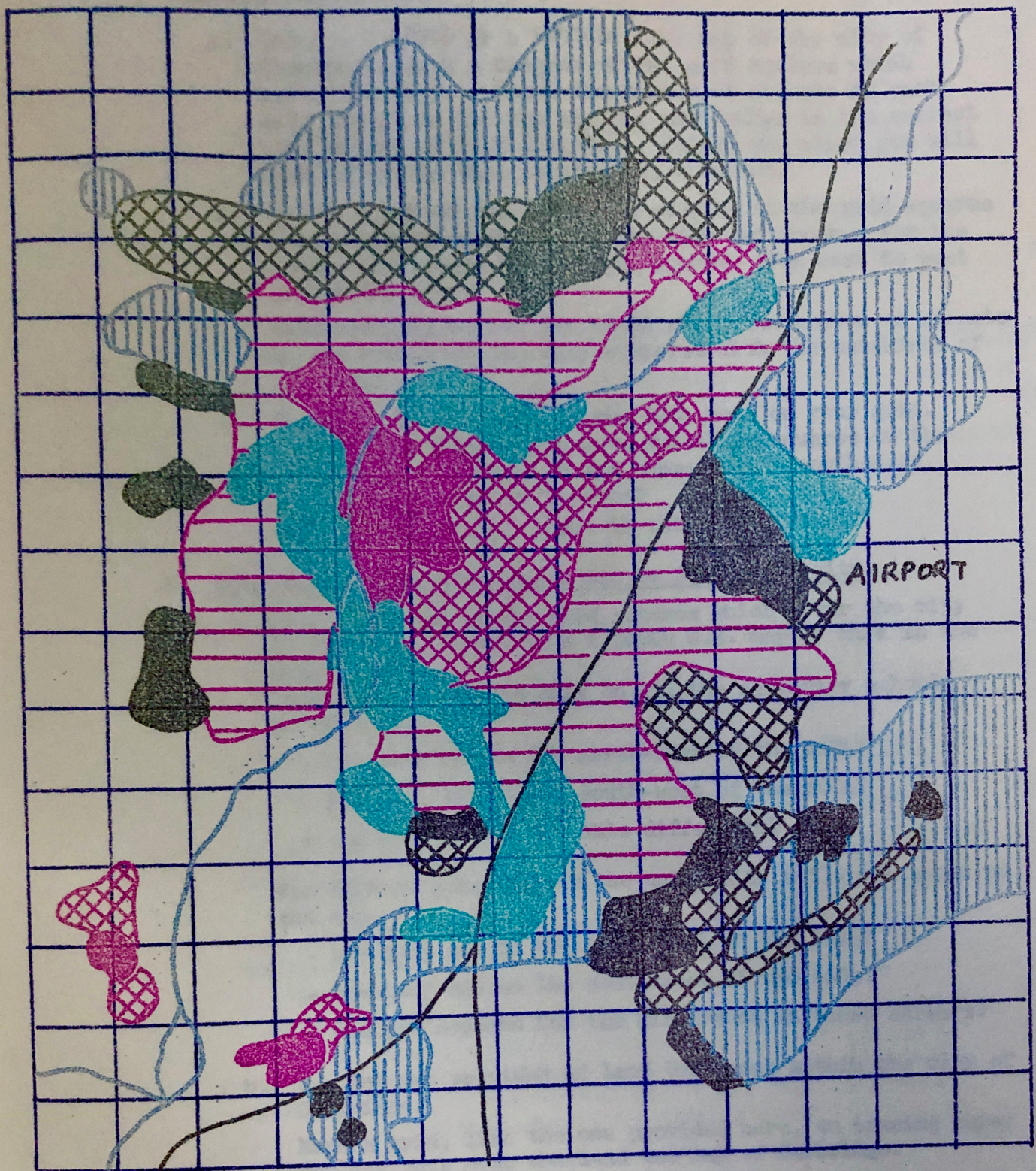
1

Scale mile



CAMBRIDGE 1961

MAP 3



URBAN LAND USE ZONES

1. That intensity of land use in a city decreases with distance from the city centre.

- a. Using a 1:25000 or a 1:50000 O.S. map of the city of Cambridge, draw a diagram of the grid squares which cover the city. Count the number of streets in each grid square on the map and put the number in the correct grid square on your diagram. Before you start you will need to decide what constitutes a street.
- b. Draw a graph of the number of streets in the grid squares from north to south across the city and another for the number of streets in the grid squares from east to west across the city.

What conclusions can you reach about the number of streets in the centre of the city compared with the outskirts of the city?

- c. Now draw in the route of the A504 road on your grid. Look at the numbers you have for these squares to the south-west of this road and those to the north-east. Do you notice any difference?
Can you explain why there is this difference?

2. That distinct land use zones may be found in a city.

- a. Draw a diagram of the grid squares which cover the city on either a 1:25000 or a 1:50000 O.S. map. Mark in the A604 road.

Look at your map and mark on all the secondary schools in the city.

- how many are to the north-east of the A604?
- how many are to the south-west of the A604?
- can you account for this difference?

Now mark on your diagram the university buildings shown on the map.

- how many are to the north-east of the A604?
- how many are to the south-west of the A604?
- can you account for the difference in these answers?

- b. Use the map provided of Land Use Zones within the city of Cambridge.

Mark a grid, like the one provided here, on tracing paper and lay this over the land use map of Cambridge.

- i. One theory (after Burgess) claims that the land use in a city changes as you move from the centre outwards
 - to test this count the number of squares of each type of land use within each ring, by placing the tracing over the land use map of Cambridge. (You will have to pick the main land use type in each square.)

Make a graph of the number of squares of each type of land use in each circle.

- Do you find that one type of land use is dominant in each circle? If so, which type of land use?

- Do you think, on the evidence of this exercise, that this theory may be applied to Cambridge?

- ii. Another theory (after Hoyt) claims that the land use in a city may be divided into sectors.

You may use the dotted lines on the tracing to graph the types from the squares in each sector.

- Do you find that one type of land use is dominant in each sector? If so, which type of land use?
- Do you think, on the evidence of this exercise, that this theory of land use may be applied to Cambridge?

- iii. Some people say that neither of these ideas are correct and that we are only able to identify areas of different land use in a city. Which of the three ideas do you think is correct?

3. That there are variations of land use within each major land use zone.

In groups, follow the routes shown on the map outwards from the city centre.

- For each building note
- a) its ground floor use,
 - b) its first, second, third floor use,
 - c) the type of shop, if that is the ground floor use,
 - d) the length of the frontage (paced).

This may be recorded on a sheet like that shown.

Each group may then produce a map of the information collected using a colour key.

- i. Ground floor use - graph the types of use at this level. This is the central district of Cambridge. Which is the main land use? Is it the only type of land use?

- ii. First, second and third floor use - draw a graph/graphs of this data. Does the evidence from these graphs match that for ground floor use?

Look at the map of these two pieces of information. Is there any variation of use depending on which street you are studying? Or on distance from the Market Place?

- iii. The type of shop. You will probably have needed to classify the types of shop in order to produce the map. Now look at this map. Do you notice any grouping of shops which
- a) have links with the University, e.g. bookshops, shops selling rare books or maps?

b) shops catering for tourists?

c) large stores?

d) typical "high street" shops?

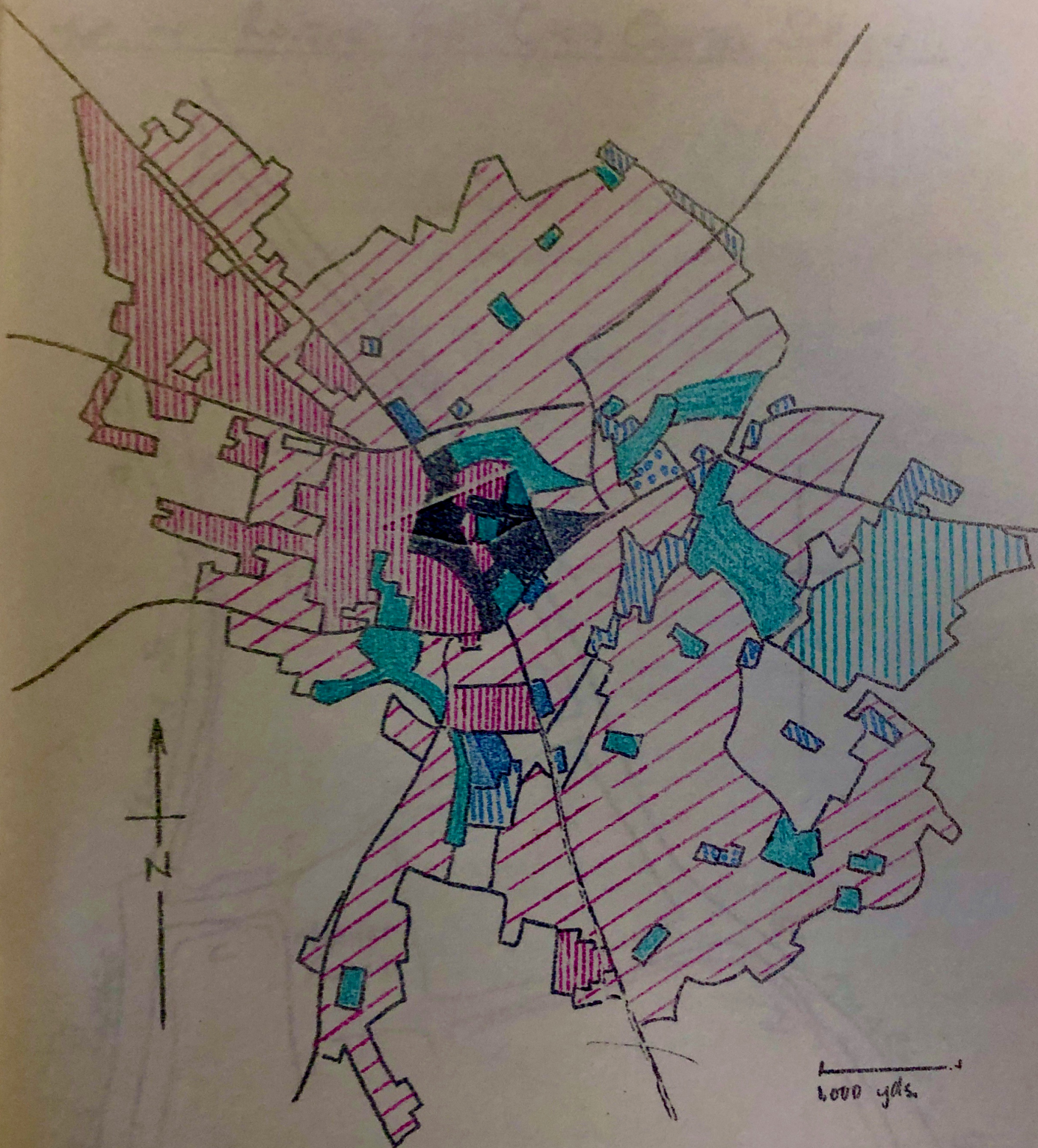
If you do find such a grouping, can you explain why this is so?

- iv. The length of the frontage. Does this vary with the type of land use? Are there some streets or areas where long frontage is more prevalent than others? Can you explain why this is so?

One interesting feature is that there is a distinct change of land use on different sides of the road in parts of the survey area - can you explain them?

(Thanks are due to Mr. Tony Parrott, of Chesterton School, for some of the ideas developed here.)

CAMBRIDGE LAND USE



RESIDENTIAL

INDUSTRIAL

COMMERCIAL/OFFICE

COMMERCIAL/WAREHOUSE



PUBLIC RECREATIONAL SPACE

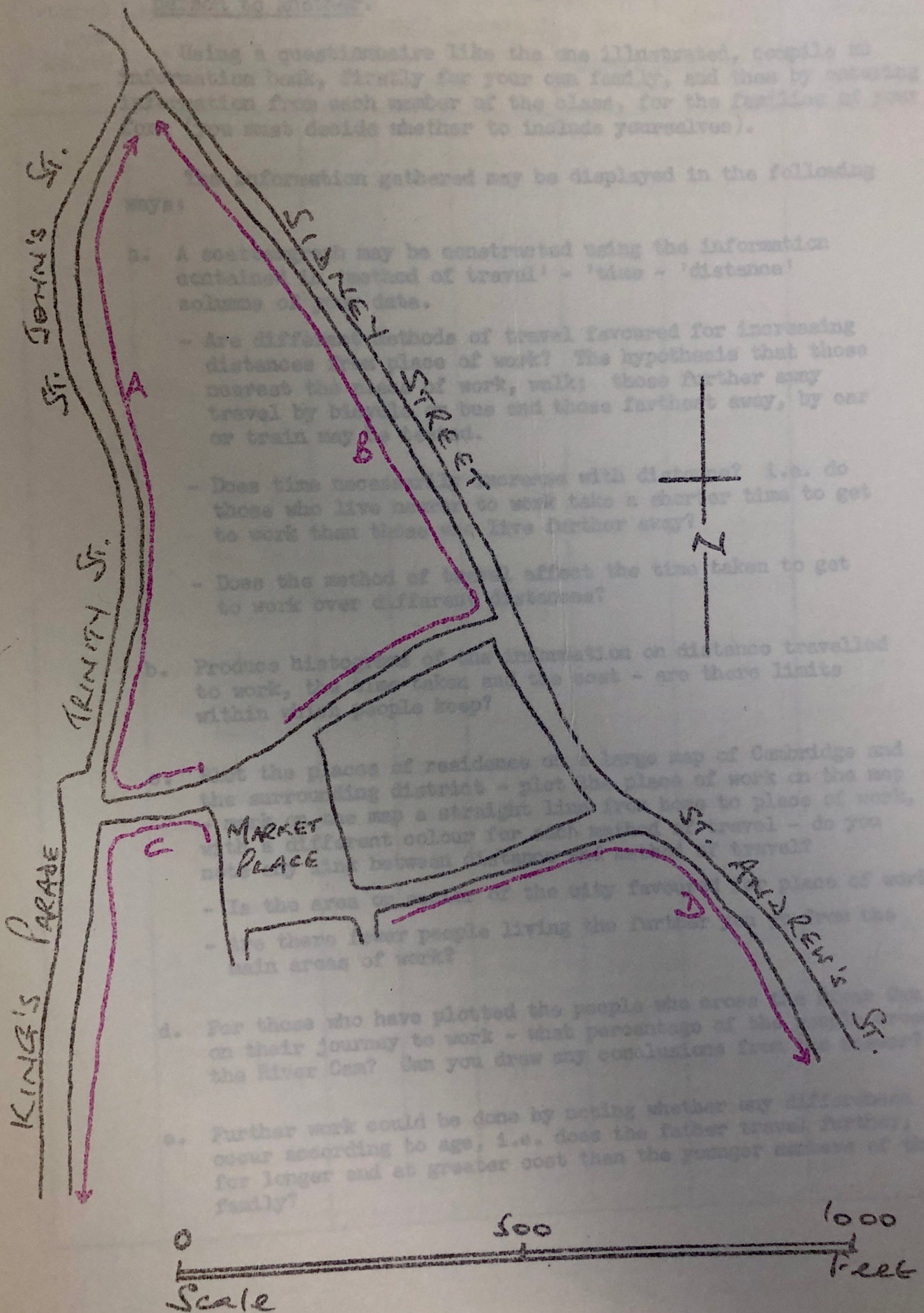
UNIVERSITY

CENTRAL AREA

AIRPORT

1. JOURNEY TO WORK.

MAP OF ROUTES FOR CITY CENTRE SURVEY



1. JOURNEY TO WORK.

1. A variety of methods of transport are used for the journey to work, and distances, the time taken and the costs also vary from one person to another.

Using a questionnaire like the one illustrated, compile an information bank, firstly for your own family, and then by entering information from each member of the class, for the families of your form (you must decide whether to include yourselves).

The information gathered may be displayed in the following ways:

- a. A scattergraph may be constructed using the information contained in 'method of travel' - 'time' - 'distance' columns of your data.
 - Are different methods of travel favoured for increasing distances from place of work? The hypothesis that those nearest the place of work, walk; those further away travel by bicycle or bus and those farthest away, by car or train may be tested.
 - Does time necessarily increase with distance? i.e. do those who live nearer to work take a shorter time to get to work than those who live further away?
 - Does the method of travel affect the time taken to get to work over different distances?
- b. Produce histograms of the information on distance travelled to work, the time taken and the cost - are there limits within which people keep?
- c. Plot the places of residence on a large map of Cambridge and the surrounding district - plot the place of work on the map - mark on the map a straight line from home to place of work, with a different colour for each method of travel - do you note any link between distance and method of travel?
 - Is the area or sector of the city favoured for place of work?
 - Are there fewer people living the further you go from the main areas of work?
- d. For those who have plotted the people who cross the River Cam on their journey to work - what percentage of the people cross the River Cam? Can you draw any conclusions from the answer?
- e. Further work could be done by noting whether any differences occur according to age, i.e. does the father travel further, for longer and at greater cost than the younger members of the family?

JOURNEY TO WORK QUESTIONNAIRE. (Sample)

Person (e.g. Father, Brother, etc.)	Home (Street, Village, Grid.Ref.)	Method of Travel	Distance	Time	Cost	Place of Work (Street, Village, Grid.Ref.)	Cam Cross- ing. Bridge used.

2. The greater the distance from the place of work the fewer the number of workers who live there.

- a. Using the map (p.31) which shows where a 14% sample of workers from Pye Telecommunications, Cambridge Works factory live, (the distances from the factory in St. Andrew's Road, are shown as concentric rings):

Count the number of workers who live in each ring of the map, i.e. how many live within ten kilometres; how many live between ten and twenty kilometres; how many live between twenty and thirty kilometres from their place of work. Complete the table below.

<u>Circle</u>	<u>No. of workers</u>	<u>Area in ring (sq.km.)</u>	<u>Density of work (per sq.km.)</u>
0 - 10km.		33.3	
10 - 20km.		99.9	
20 - 30km.		166.5	
30km.			

TOTALS

For calculation of area of rings - see appendix.

- Are there more workers living within the first ring than the others? If so, why is this?
 - Has the first ring the highest density of workers? Why is this so?
 - What happens to the number of workers as one moves further from the place of work?
 - Marked on the map is the boundary of the City of Cambridge - how many workers live outside this boundary yet work in the city? What percentage of workers is this? Do you think this is typical of the workers in the City as a whole?
- b. Divide the map into four sectors or quadrants and count the number of workers in each quadrant - (since the area of each quadrant is the same we need not work out the density of each quadrant).
- Do some quadrants have more workers than others? Can you think of reasons why more workers come to the factory from one quadrant than others?
- c. A similar exercise may be undertaken using the information (p.32), this time taken on a 14% sample from Pye Ltd. in St. Andrew's Road. Can you account for any differences or similarities you notice between the distances travelled and the number of workers in the quadrants?
- (Note: Pye Telecommunications, Cambridge Works Factory has a workforce of factory workers whereas Pye Ltd. has a workforce of mainly office workers.)
- d. Can you account for any differences or similarities in the distances travelled to work by males and females in these samples?
- e. An exercise graphing method of travel and distance may well show the utilization of differing methods of travel with increasing distance.

- f. Using the list of villages and numbers of workers from each who work in Cambridge, work out the percentage of those who are economically active who work in Cambridge: plot these percentages next to the circle for each village. The distance of the village from the centre of Cambridge may be measured from the map and this figure also placed next to the village on the map. Find the average percentage of the economically active who work in Cambridge from the villages within the following distances - 0 - 10 kms / 10 - 20 kms / 20 - 30 kms / 30 - 40 kms / 40 - 50 kms, and fill in the framework provided. Draw a graph of these figures and write what you note by completing the following sentence -

"As the distance from the centre of Cambridge increases"

0 - 10 kms	33.3
10 - 20 kms	99.9
20 - 30 kms	100.0
30 - 40 kms	
40 - 50 kms	

TOTALS

For calculation of area of rings - see appendix.

- Are there more workers living within the first ring than the others? If so, why is this?

- Has the first ring the highest density of workers? Why is this so?

- What happens to the number of workers as one moves further from the place of work?

- Marked on the map is the boundary of the City of Cambridge - how many workers live outside this boundary yet work in the city? What percentage of workers is this? Do you think this is typical of the workers in the City as a whole?

b. Divide the map into four sectors or quadrants and count the number of workers in each quadrant - (allow the area of each quadrant is the same we need not work out the density of each quadrant).

- Do some quadrants have more workers than others? Can you think of reasons why more workers come to the factory from one quadrant than others?

c. A similar exercise may be undertaken using the information (p. 32) - this time taken on a 1/2 mile scale from the 1/2 mile to St. Andrew's Road. Can you account for any differences or similarities you notice between the distances travelled and the number of workers in the quadrants?

(Note: The Telecommunications, Cambridge Works factory has a workforce of factory workers whereas the 1/2 mile

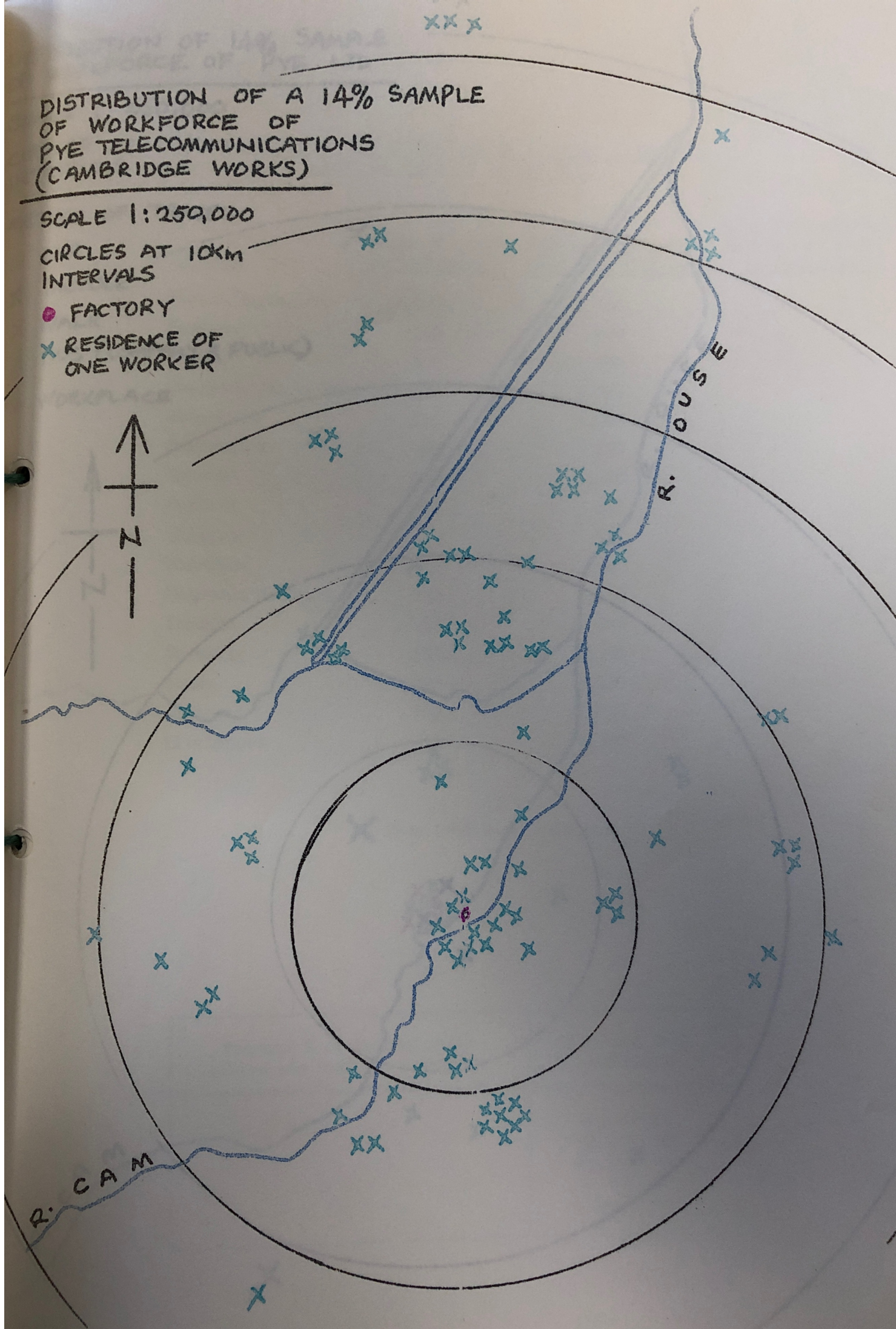
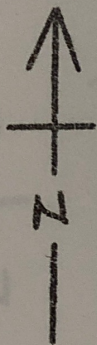
DISTRIBUTION OF A 14% SAMPLE
OF WORKFORCE OF
PYE TELECOMMUNICATIONS
(CAMBRIDGE WORKS)

SCALE 1:250,000

CIRCLES AT 10KM
INTERVALS

● FACTORY

x RESIDENCE OF
ONE WORKER



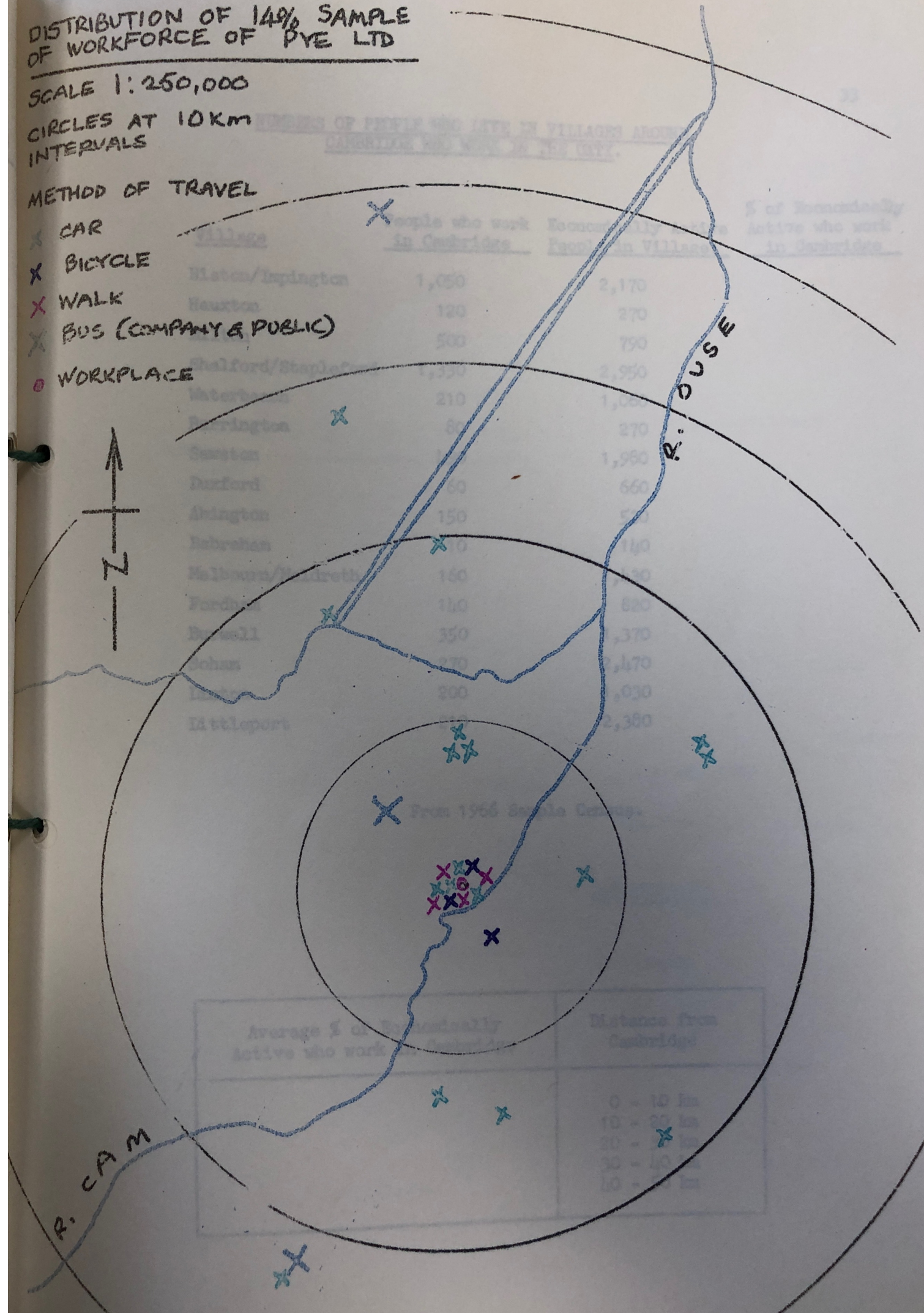
DISTRIBUTION OF 14% SAMPLE OF WORKFORCE OF PYE LTD

SCALE 1:250,000

CIRCLES AT 10KM
INTERVALS

METHOD OF TRAVEL

- X CAR
- X BICYCLE
- X WALK
- X BUS (COMPANY & PUBLIC)
- WORKPLACE



NUMBERS OF PEOPLE WHO LIVE IN VILLAGES AROUND
CAMBRIDGE WHO WORK IN THE CITY.

<u>Village</u>	<u>People who work in Cambridge</u>	<u>Economically Active People in Village.</u>	<u>% of Economically Active who work in Cambridge</u>
Histon/Impington	1,050	2,170	
Hauxton	120	270	
Milton	500	790	
Shelford/Stapleford	1,330	2,950	
Waterbeach	210	1,060	
Barrington	80	270	
Sawston	490	1,980	
Duxford	60	660	
Abington	150	530	
Babraham	10	140	
Melbourn/Meldreth	160	1,430	
Fordham	140	820	
Burwell	350	1,370	
Soham	270	2,470	
Linton	200	1,030	
Littleport	210	2,380	

From 1966 Sample Census.

<u>Average % of Economically Active who work in Cambridge</u>	<u>Distance from Cambridge</u>
	0 - 10 km
	10 - 20 km
	20 - 30 km
	30 - 40 km
	40 - 50 km

There is a fairly steady flow of traffic throughout the day.
The journey is short.

Use the traffic census figures for one or more of the main roads leading into and out of Cambridge. These could be collected by the pupils; or the accompanying graphs could be used.

Describe the pattern of traffic movement along the road during the day - can you account for this pattern?

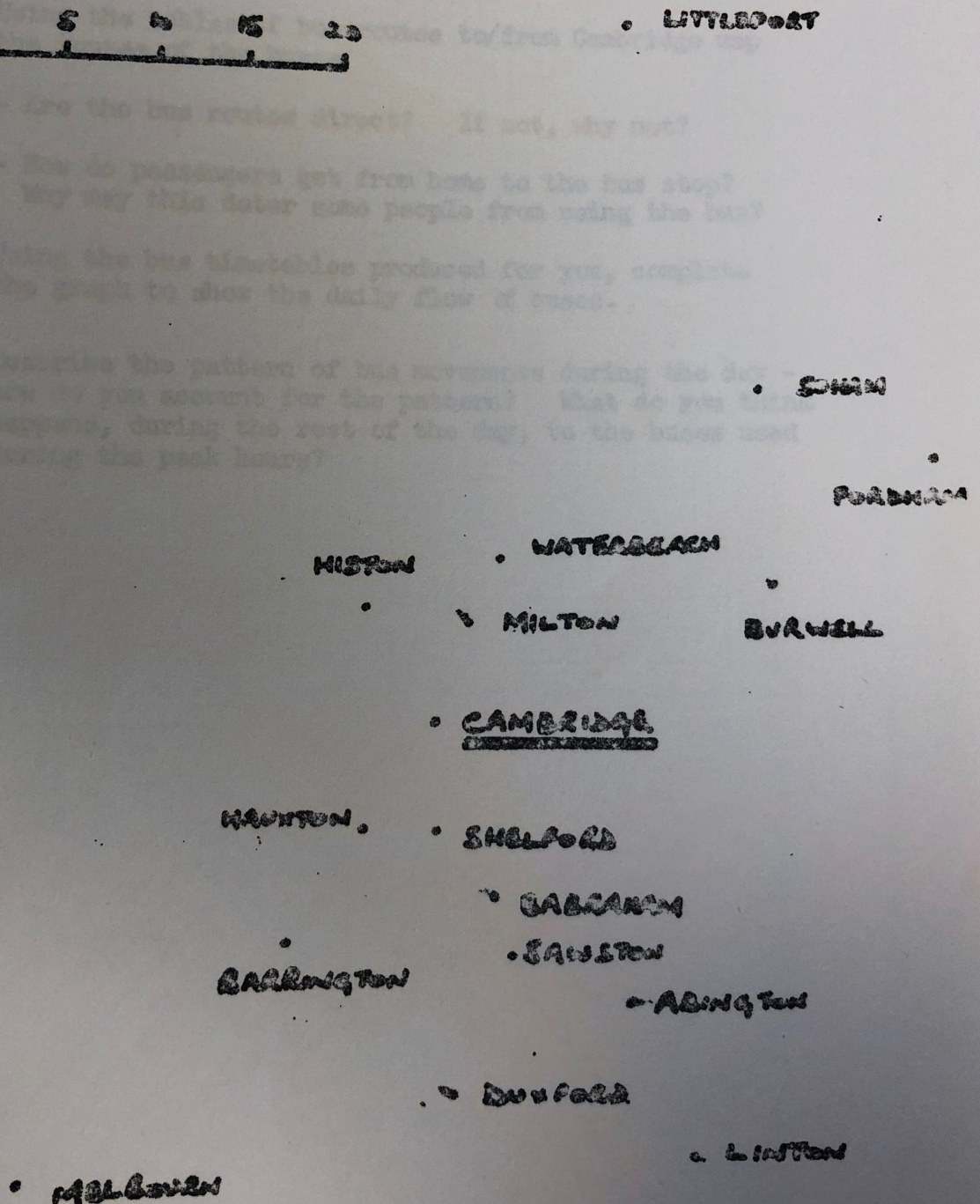
SCALE: 0 5 10 15 20 miles to/from Cambridge city

Are the bus routes direct? If not, why not?

How do passengers get from home to the bus stop? Why do this deter some people from using the bus?

Using the bus timetables produced for you, complete the graph to show the daily flow of buses.

Describe the pattern of bus movements during the day. How do you account for the pattern? What do you think happens, during the rest of the day, to the buses used during the peak hours?



3. There is a daily rhythm of transport movements associated with the journey to work.

a. Use the traffic census figures for one or more of the main roads leading into and out of Cambridge (these would be collected by the pupils; or the accompanying graphs could be used)

- Describe the pattern of traffic movement along the road during the day - can you account for this pattern?

b. Using the tables of bus routes to/from Cambridge map the routes of the buses

- Are the bus routes direct? If not, why not?
- How do passengers get from home to the bus stop?
Why may this deter some people from using the bus?

Using the bus timetables produced for you, complete the graph to show the daily flow of buses.

Describe the pattern of bus movements during the day - how do you account for the pattern? What do you think happens, during the rest of the day, to the buses used during the peak hours?

NAME OF ROAD SHELFORD ROAD

30

DATE 22ND/23RD JULY 1974

PERIOD OF COUNT 2 DAYS

TIME COMMENCED MIDNIGHT

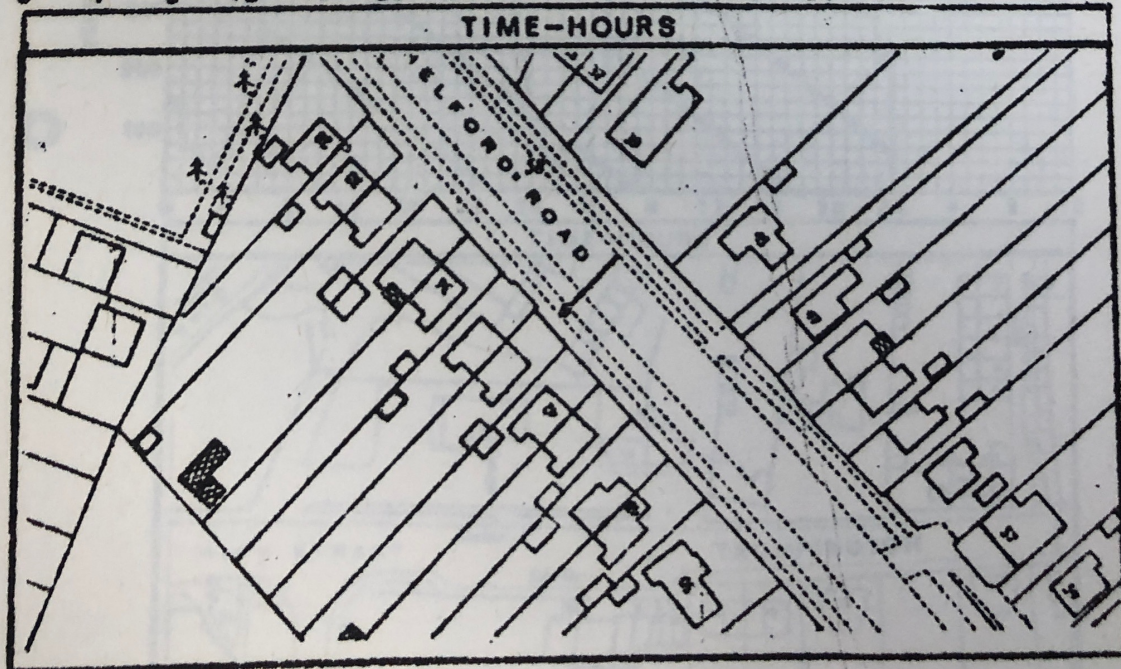
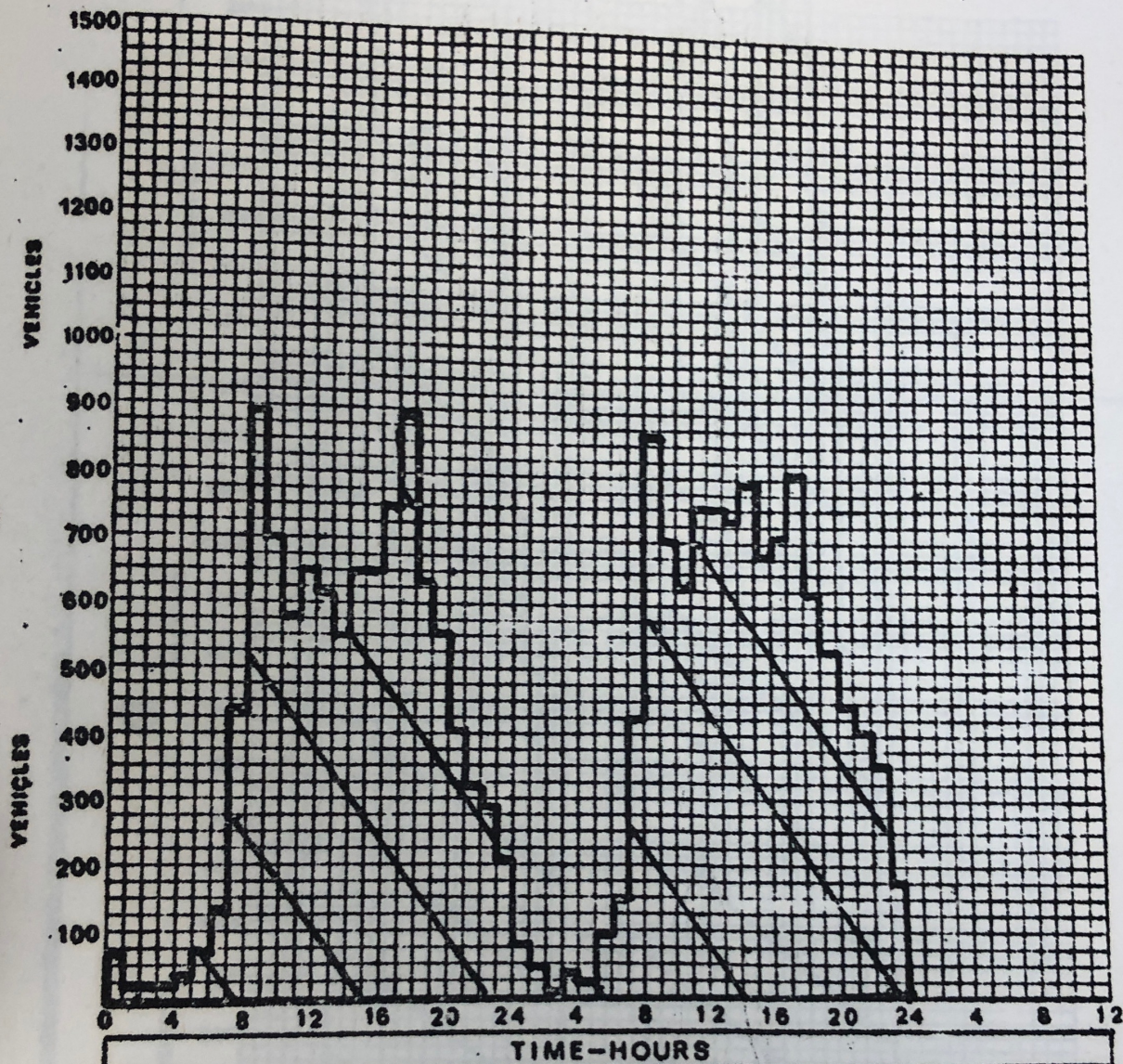
DIRECTION OF TRAFFIC BOTH

CARRIAGEWAY WIDTH _____

VEHICLE TOTAL

1 / 24

HOUR PERIOD 10.670 AV.



SITE PLAN Scale 1:1250

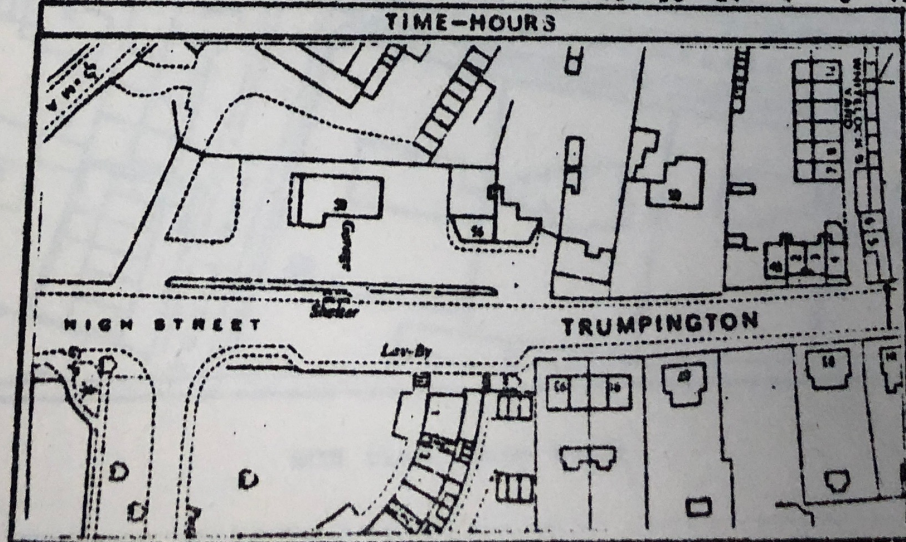
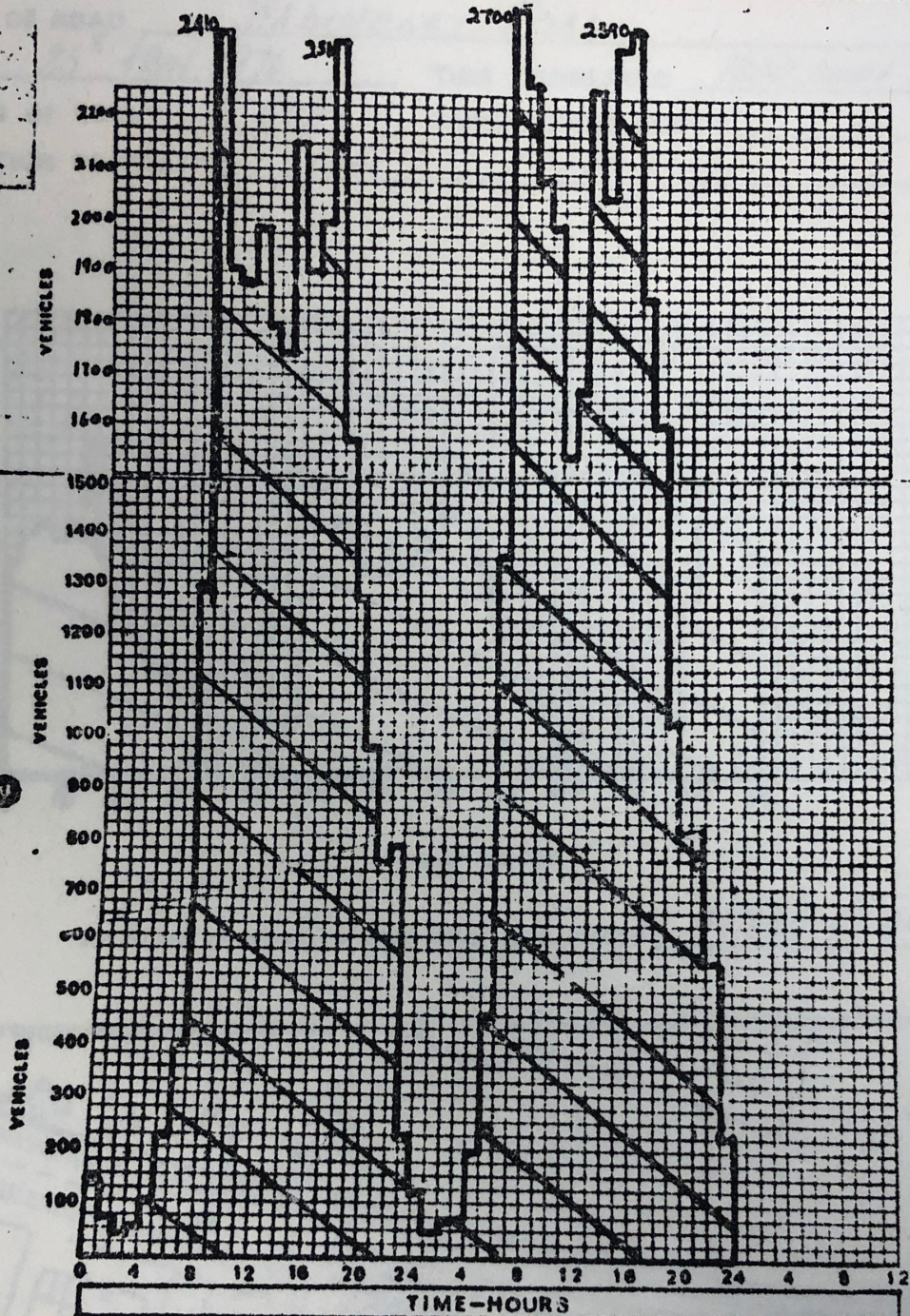
VEHICLE COUNT

NAME OF ROAD HIGH STREET. TRUMPINGTON

DATE 31st OCT - 1st Nov '72 TIME COMMENCED MIDNIGHT

PERIOD OF COUNT 2 DAYS CARRIAGEWAY WIDTH _____

DIRECTION OF TRAFFIC BOTH DIRECTIONS - 24 HOURS. 29.330. AV.



VEHICLE COUNT

MB

NAME OF ROAD

MADINGLEY ROAD

DATE

25th April 1972

TIME COMMENCED

1200 hours

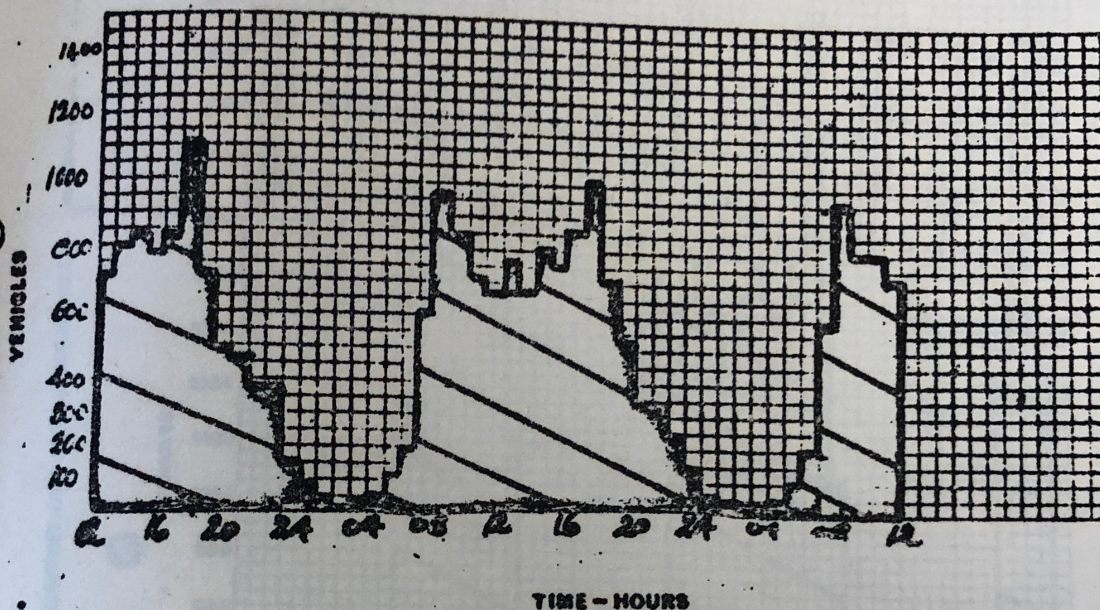
PERIOD OF COUNT

2 days

CARRIAGEWAY WIDTH

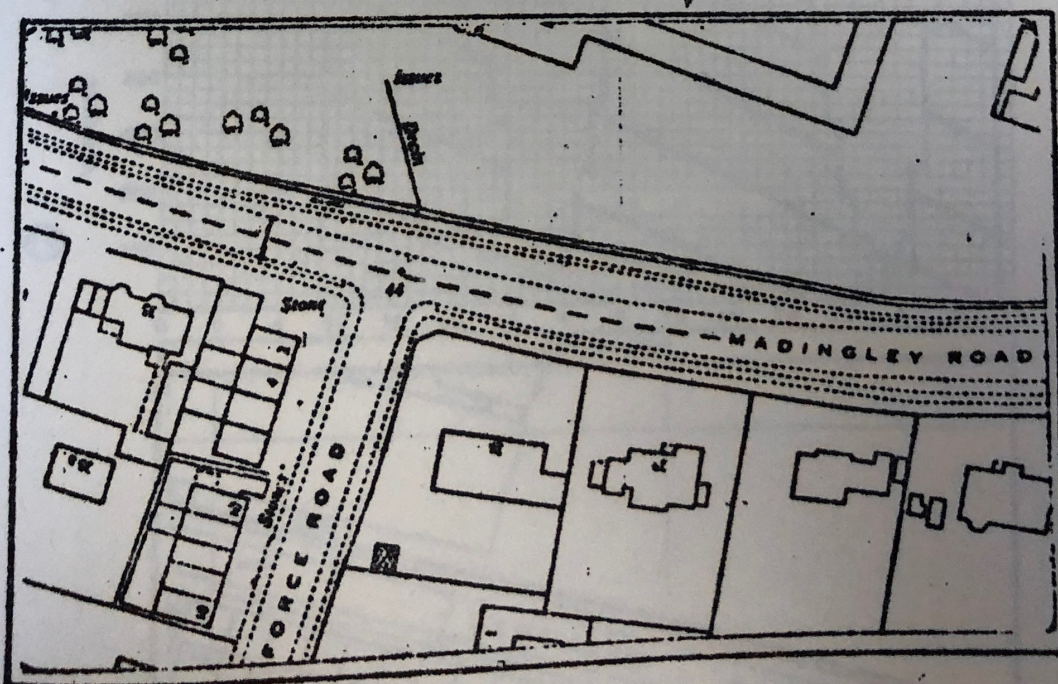
DIRECTION OF TRAFFIC

Both



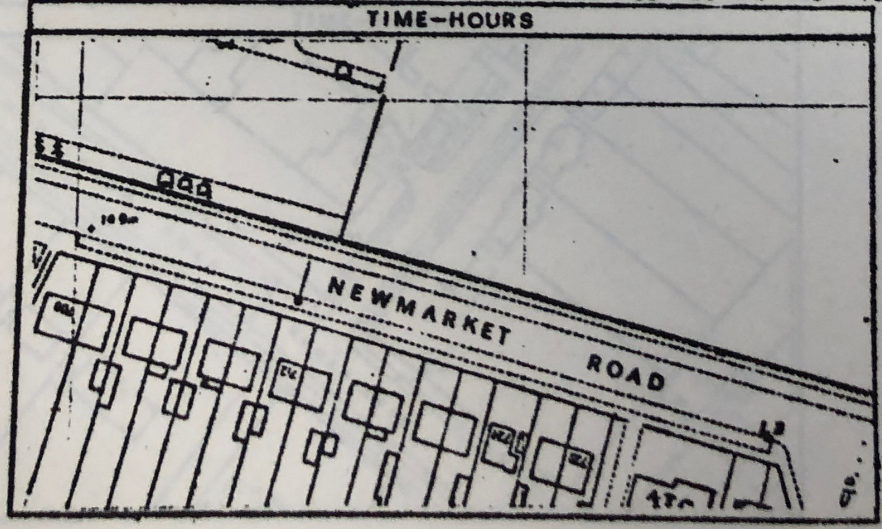
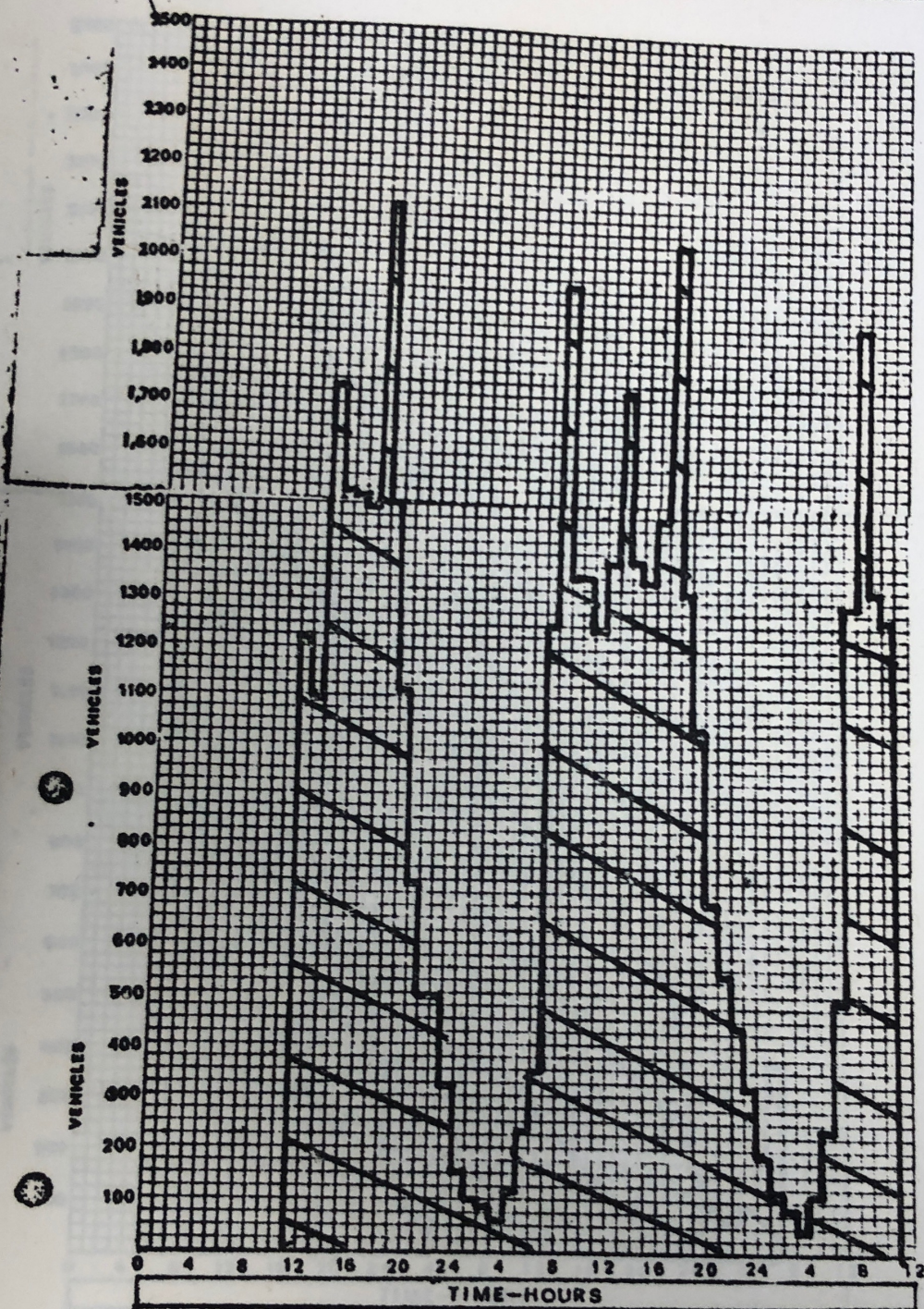
TOTAL NO OF VEHICLES OVER 24 HOUR PERIOD

11700 (Average)

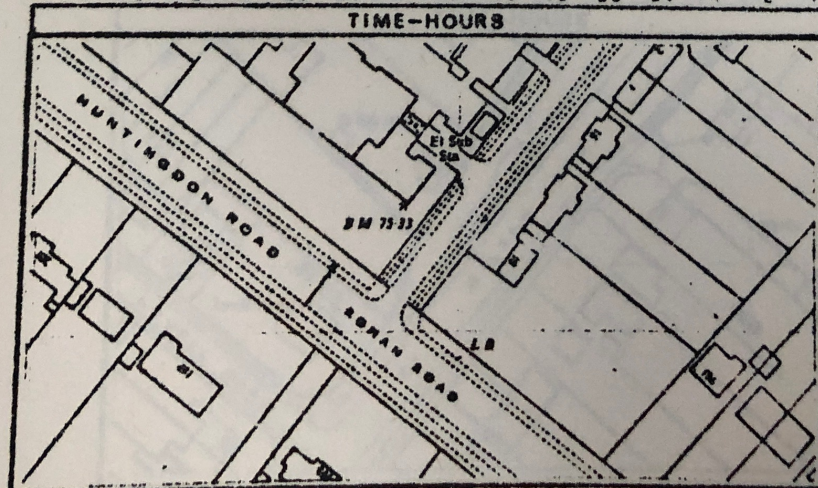
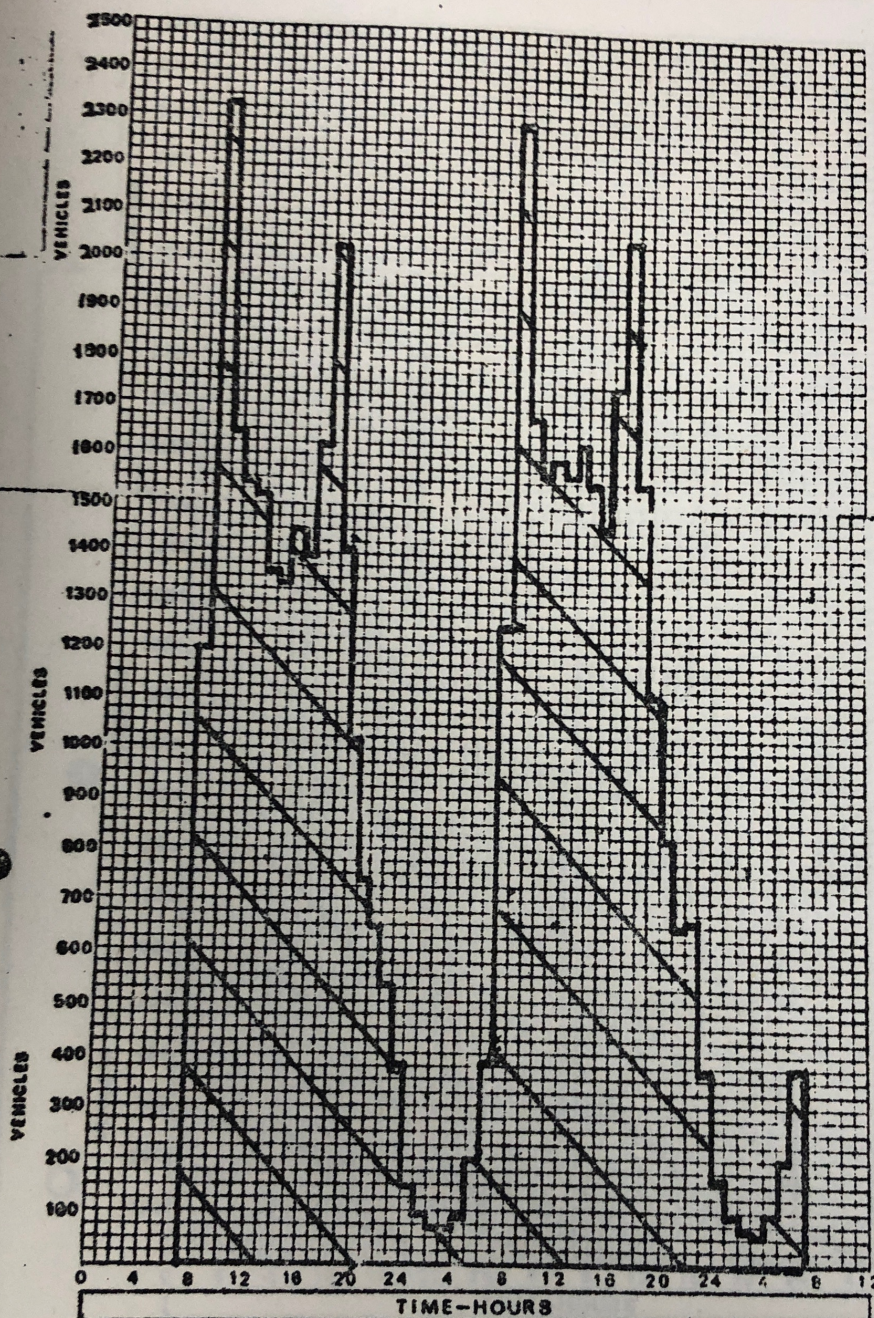


SITE PLAN Scale 1:1250

NAME OF ROAD NEW MARKET ROAD
 DATE 25TH/26TH APRIL 1973 TIME COMMENCED MIDDAY
 PERIOD OF COUNT 2 DAYS CARRIAGEWAY WIDTH _____
 DIRECTION OF TRAFFIC BOTH DIRECTIONS
 VEHICLE TOTAL 14124 HOUR PERIOD 22.035 Av.



NAME OF ROAD HUNTINGDON ROAD. (HOWES PLACE)
 DATED THURS 12th JULY 1974 TIME COMMENCED 7 AM
 PERIOD OF COUNT 2 DAYS CARRIAGEWAY WIDTH
 DIRECTION OF TRAFFIC BOTH
 VEHICLE TOTAL 24 HOUR PERIOD 24.210. Av.



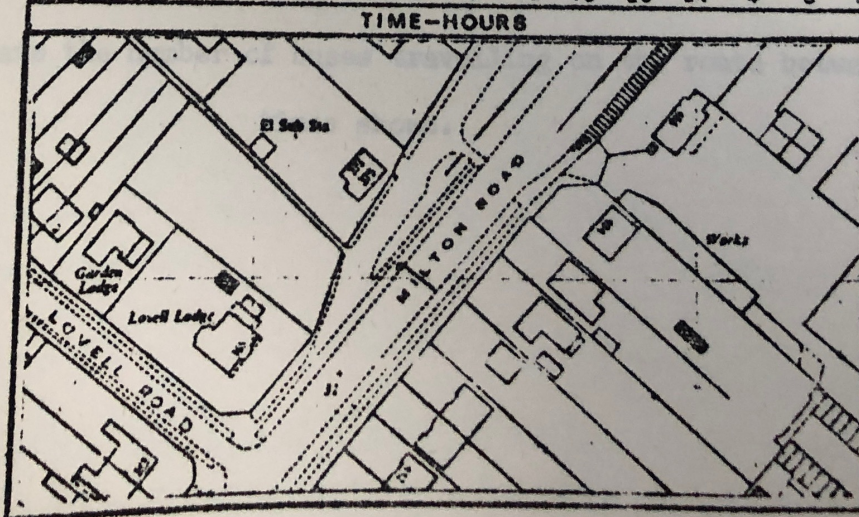
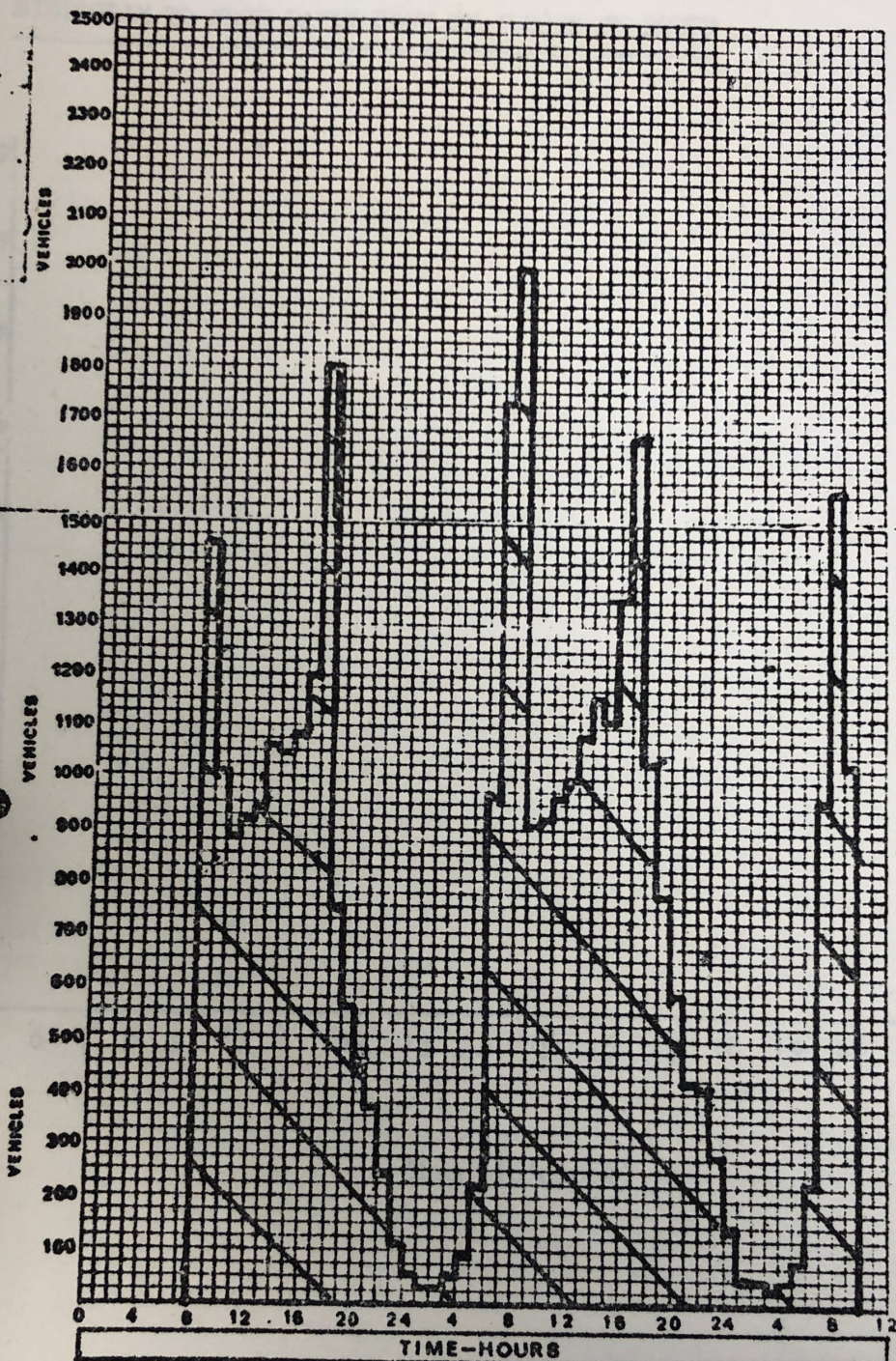
NAME OF ROAD MILTON ROAD

DATE 30TH APRIL / 1ST MAY 1973. TIME COMMENCED 8 AM

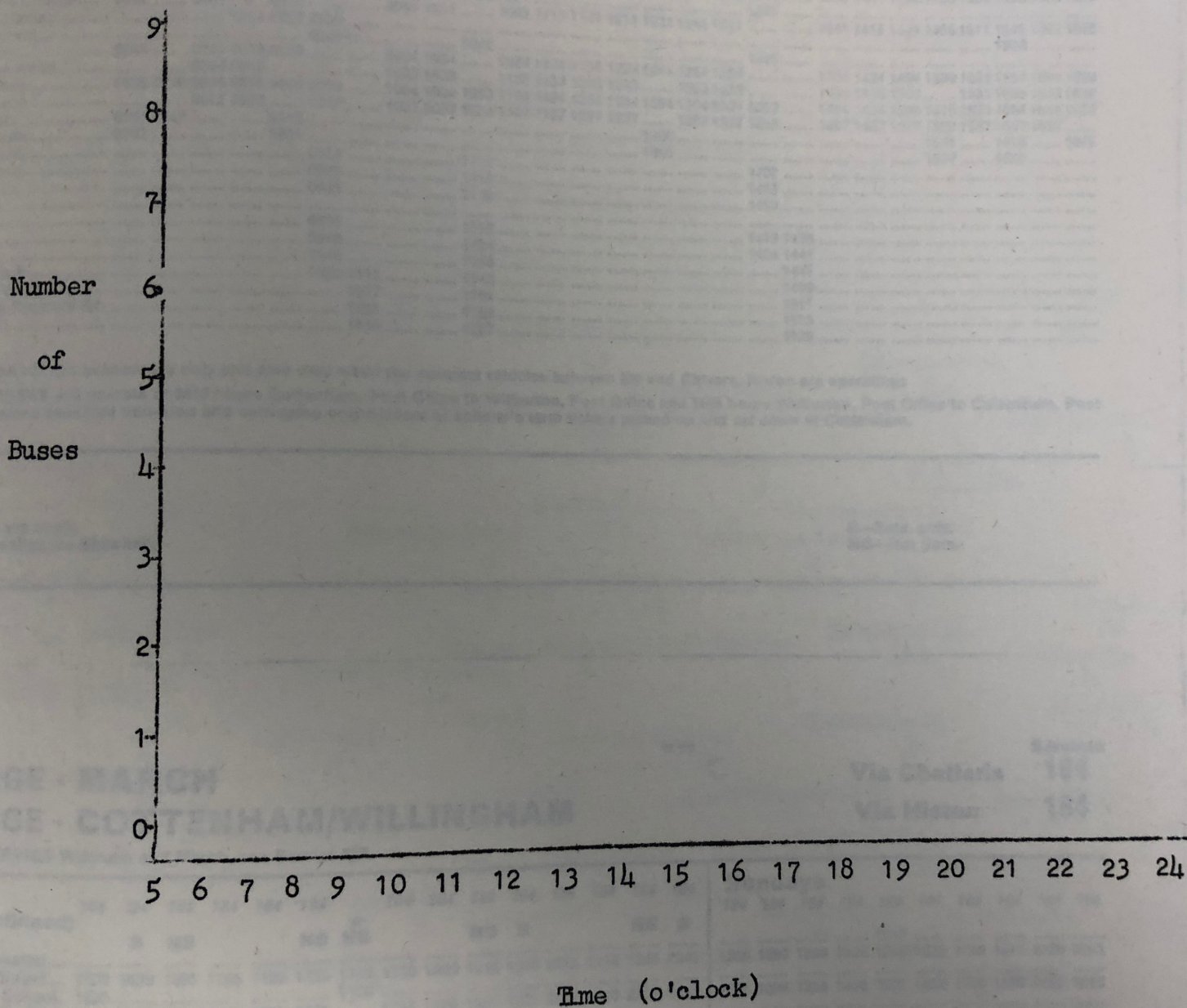
PERIOD OF COUNT 2 DAYS CARRIAGEWAY WIDTH

DIRECTION OF TRAFFIC BOTH DIRECTIONS

VEHICLE TOTAL ☒ 24 HOUR PERIOD Av. 17,150



HISTOGRAM TO SHOW DAILY FLOW OF 'BUSES ON ROUTE



Indicate the number of buses travelling on the route between the times shown.

ADDITIONAL SERVICE Witcham and March, see Service 353.
Including part of Service 353.

Weekdays

[illegible]

ADDITIONAL JOURNEYS will operate at 0810 hours Cottenham, Post Office to Wilburton, Post Office and 1634 hours Wilburton, Post Office to Cottenham, Post Office Friday afternoons excepted non-stop and conveying only holders of scholar's term tickets picked up and set down at Cottenham.

Sch—When Schools are open.
♦—Operates in Cambridge via Shirehall.

S—Sats. only.
NS—Not Sats.

For ADDITIONAL SERVICE Witcham and March, see Service 353.

	Services
Via Chatteris	104
Via Histon	184

Weekdays (continued)

Weekdays (continued)	104	184	184	184	184	184	184	184	184	104	184	184	184	184	184	Sundays	184	184	184	184	104	184	184	104	184	184	
	S	NS				NS	★			NS	S				NS	S											
CAMBRIDGE, New Hospital.....																					1540						
Cambridge, Drummer Street.....	1630	1630	1650	1705	1720	1735	1745	1750	1820	1915	1915	2015	2110	2245	2245		1000	1200	1350	1430	1555	*1630	1740	1917	2120	2245	
Cambridge, Milton Rd. School..	1635						1750																				
Cambridge, St. Luke's Church..		1636	1656	1711	1726	1741		1756	1826	1921	1921	2021	2116	2251	2251		1006	1206	1356	1436	1601	1636	1746	1923	2126	2252	
Histon, Rose and Crown.....	1645																										
Histon, School Green.....		1649	1709	1724	1739	1754		1809	1839	1934	1934	2034	2129	2304	2304		1019	1219	1409	1449	1614	1649	1759	1936	2139	2304	
Cottenham, Denmark Road.....		1658		1733		1803			1848	1943	1943	2043	2138	2313	2313		1027	1227	1417	1457		1657	1807		2147	2312	
Cottenham, Post Office.....	1653	1659	1719	1734	1749	1804		1819	1849	1944	1944	2044	2139	2314	2314		1028	1228	1418	1458	1623	1658	1803	1945	2148	2313	
COTTENHAM, Church.....		1656	1702	1722	1737	1752	1807		1822	1852	1947	1947	2047	2142	2317	2317		1030	1230	1420	1500	1625	1700	1810	1947	2150	2315
Rampton, Post Office.....			1731		1801			1831						2151		2326				1508					2158		
WILLINGHAM, Church.....			1737		1807			1837						2157		2332											
Willburton, Post Office.....	1708						1827			1959						2332					1637			1959			
Haddenham, Memorial.....	1713						1832			2006											1642			2006			
Witcham, Toll.....	1719						1836			2012											1648			2012			
Witcham, Village.....	1721									2014											1650			2014			
Witcham, Toll.....	1723						1836			2016											1652			2016			
Sutton, Ship.....	1728						1846			2021											1657			2021			
Mepal, Green.....	1734						1852			2027											1703			2037			
CHATTERIS, Car Park.....	1746						1904			2039											1715			2039			
Doddington, Clock Tower.....	1758						1916			2051											1727			2051			
Wimblington, P. & P.'s Garage.	1802						1920			2055											1731			2055			
MARCH, Fountain.....	1811						1929			2104											1740			2104			

- ★—Service 124/353 via Millon and Stretham (passengers change at Sutton).
- †—Arrives 2004.
- †—Arrives 2003.
- Arrives 1500.

S—Sats. only.
NS—Not Sats.

TRAVEL TO
LONDON
BY COACH

DAILY SERVICES from CAMBRIDGE

LEAFLETS, BOOKINGS & INFORMATION from TRAVEL OFFICE, DRUMMER ST.

- Cheap Fares
- Guaranteed Seats

4. The method of transport used by people in travelling to work varies.

- a. Produce a pie graph of method of transport to work using the information you obtained in the class census made earlier.
- b. Look at the information of numbers of workers from towns and villages around Cambridge who travel to work in company buses to the Pye group of companies.
 - i. an exercise similar to that using concentric rings and quadrants may again be utilised.
 - ii. the routes taken by the buses may be plotted or worked out on a map of suitable scale.

(The numbers shown on this map account for some 23% of the workforce of 4,715 on 23rd August 1974. Many people travel from the villages to the Group's factories in Cambridge by car although recently the percentage travelling by bus has increased.)

5. The daily rhythm and method of travel (especially the motor car) can have serious consequences for the transport systems of the city (i.e. create congestion).

- a. Plot the places of residence of the persons from your class census data sheet and their place of work.
 - for each plot the shortest route to work on a street map of Cambridge. If they come from outside Cambridge then plot them entering along the most suitable route.
 - are some roads used more than others? What might the effect be of over use of roads?
 - compare this with the daily rhythm of movement . how may this add to the congestion?
 - compare these findings with the bus timetable and route information - how may this add to the congestion?
- b. One journey to work simulation is provided - 'Journey to Work' simulates the frustrations of the journey to work and provides a discussion point for the problems encountered during the journey and the need for planning of routes and along the routes.

JOURNEY TO

WORK.

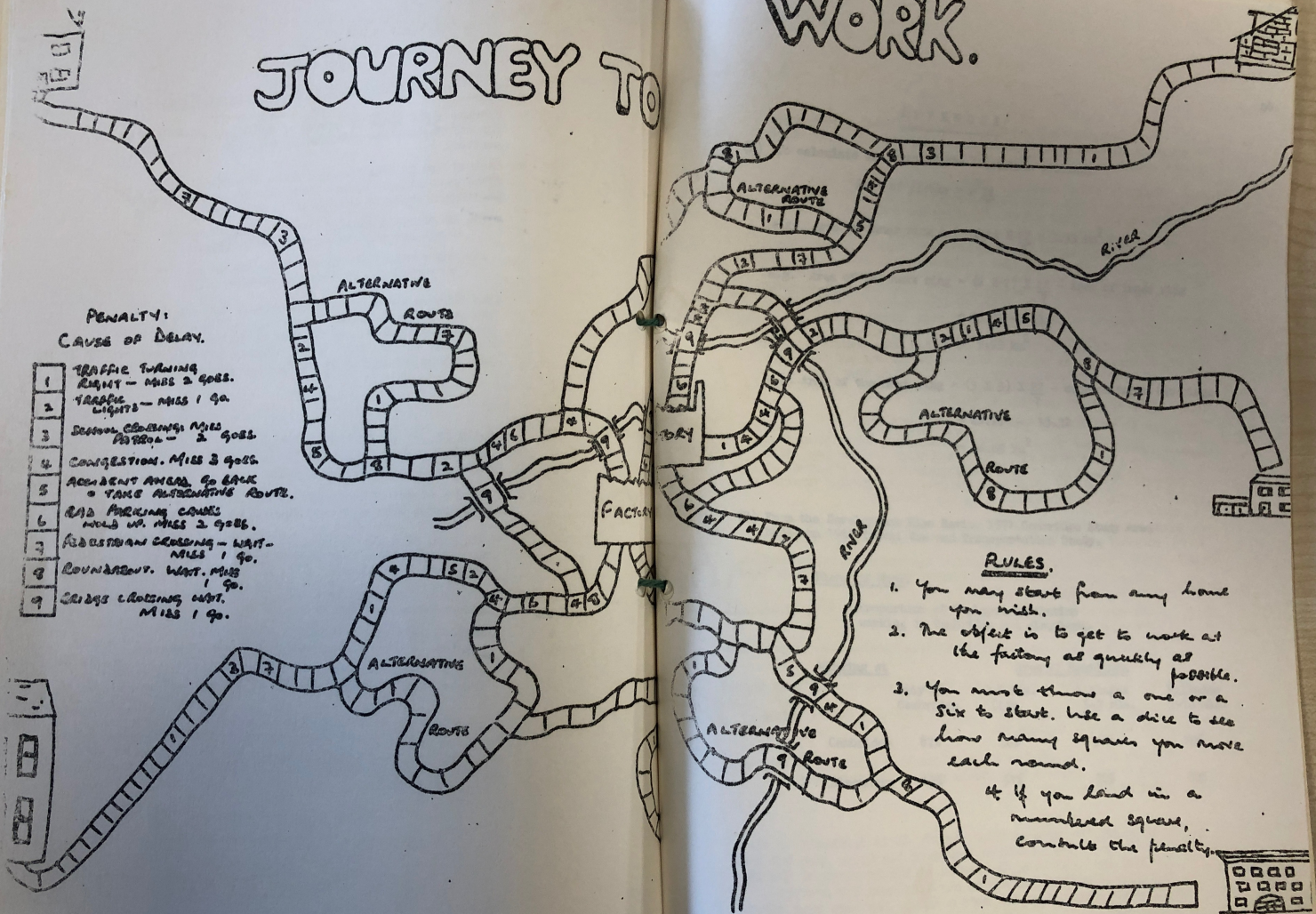
PENALTY: CAUSE OF DELAY.

- | | |
|---|---|
| 1 | TRAFFIC TURNING RIGHT - MISS 2 GOES. |
| 2 | TRAFFIC LIGHTS - MISS 1 GO. |
| 3 | SCHOOL CROSSING - MISS 2 GOES. |
| 4 | CONGESTION - MISS 3 GOES. |
| 5 | ACCIDENT AHEAD, GO BACK & TAKE ALTERNATIVE ROUTE. |
| 6 | ROAD WORKING CAUSES HOLD UP. MISS 2 GOES. |
| 7 | PEDESTRIAN CROSSING - WAIT - MISS 1 GO. |
| 8 | ROUNDABOUT. WAIT. MISS 1 GO. |
| 9 | BRIDGE CROSSING WAIT. MISS 1 GO. |

RULES.

1. You may start from any home you wish.
2. The object is to get to work at the factory as quickly as possible.
3. You must throw a one or a six to start. Use a dice to see how many squares you move each round.

If you land in a numbered square, consult the penalty.



APPENDIX

- (A) To calculate the area of the concentric circles;

$$\text{Area of circle} = \pi r^2 \frac{22}{7}$$

e.g. Area of inner ring = $(1 \times 1) \times \frac{22}{7} = 3.33 \text{ km}^2$

e.g. Area of the next ring = $(2 \times 2) \times \frac{22}{7} - \text{area of inner ring}$
 $= 13.32 - 3.33$

$$= 9.99 \text{ km}^2$$

e.g. Area of the next ring = $(3 \times 3) \times \frac{22}{7} - \text{area of inner two rings}$

$$= 29.97 - 13.32$$

$$= 16.65 \text{ km}^2$$

- (B) From the Development Plan Review 1971 Cambridge Study Area based on 1967 Travel Use and Transportation Study.

Place of Work.

Proportion of Employed Population working in Cambridge and elsewhere.

Working at

Area of Residence

	City of Cambridge	3-5 mls. City	Villages 5-7 mls.	Villages 7-10 mls.
Cambridge	87%	49%	30%	20%
Elsewhere	13%	51%	70%	80%

S H O P P I N G

Local shopping centres serve a relatively small market area, often within walking distance of the shops, and sell goods which meet the customers' everyday needs.

There is almost certainly a local shopping centre near the school. The group could obtain information about the centre by splitting into groups and investigating the following facets:

- a. The market area of the centre - (this and other aspects are represented on the questionnaire - by asking shoppers the street in which they live - this may be plotted, i.e. a cross or dot on a street map of the area - it is possible to find the market area by drawing a line joining the furthest dots. Is the market area a circle or does it stretch one way? Is there a barrier, i.e. a main road, river, etc.?

If in addition shoppers are asked how they travelled to the centre, i.e. by walking, bicycle, car or bus and these are plotted by making a cross or dot for where they live in different colours, according to the method of transport used, then it may be possible to find out:

- i. what form of transport most people used;
 - ii. whether the people who live nearest, walk; those that live further away, cycle and those further away still, come by car. This information shown by the graph (either block or scattergraph) or by drawing circles at $\frac{1}{4}$ km intervals on the map discussed.
- b. What types of shop are there? The task here is to map the shopping centre labelling the types of shop to be found there.
 - Make a list of everyday needs of the family - e.g. groceries, cigarettes, etc. Check how many of the shops sell goods like these, i.e. low order goods.
 - How many of the shops sell 'middle' order goods like electrical goods or clothes?
 - How many of the shops sell 'high' order goods, i.e. carpets and furniture?
 - How many of the shops sell all three or even two of these three?

A graph of these figures will provide a pattern and an attempt could be made to explain it.

Shoppers could be asked on the questionnaire which goods they are buying at the centre - this should reflect the information collected above.

- c. How large are the shops at this centre? It is difficult to find out how large a shop is without measuring its floor area but some indication may be given by the length of the frontage of the shop
 - therefore shop frontages may be paced out and the average length found - some shops may have a larger frontage than others
 - why is this?

SHOPPING QUESTIONNAIRE

Could you please help me by answering a few questions?

1. Are you visiting the shops here? YES NO
2. How often do you visit the shops here? EVERY DAY TWICE A WEEK ONCE A WEEK ONCE A FORTNIGHT ONCE A MONTH
3. Could you tell me how you travelled here? WALKED CYCLE CAR BUS OTHER
4. Could you tell me which street you live in?
5. Could you tell me what are the main things you are buying from the shops here?

- d. How many people pass the shops in this centre? A sample pedestrian count would give the information - do you think there are many people 'window shopping'? or much 'passing' trade?

A count of people going in and out of the shops would give some indication of the shops most used - why is this so? are they 'low', 'middle' or 'high' order shops? are they special service shops, i.e. post office) How often are the shops visited? - does this reflect the type of shop?

2. The central shopping area of Cambridge has a large market area covering many miles distant and will sell goods of every description, many of the shops being large. The larger the shopping centre, the wider the market area; the larger the shop, the higher the threshold population. The work on the local area may be compared with the central shopping area of Cambridge. Much information may be gained in a similar way or from such information contained below:

- a. The market area of the central shopping district is very large, well beyond the city boundary.

- The group could each name ten shops in the centre of Cambridge - two of these may occur regularly, i.e. Eaden Lilley and Robert Sayle who furnished the following information:

- on the accompanying sheet is part of a reply to a letter asking one shop in the centre of Cambridge for information - and the chart delivered with it. By using this information in conjunction with an Ordnance Survey map of the area - complete the columns below with the delivery day, distance and direction of the following villages from the shop.

(Bear in mind the goods sold by these shops.)

C O P Y O F L E T T E R

From: W. Eaden Lilley & Co.Ltd.,
Market Street,
Cambridge CB2 3PD.

August 1975

Dear Sir,

Having received your letter requesting details of our delivery service, we are delighted to furnish you with the information.

We cover an area approximately 40 miles radius of Cambridge and to do that we have split the area into journeys numbering one to nine.

Numbers one, two and three are journeys carried out on Monday, Wednesday and Friday for town only. Numbers four, five and six are journeys to the country Tuesday of each week. Numbers seven, eight and nine also journeys to the country carried out on a Thursday of each week.

Yours faithfully,

p.p. W. EADEN LILLEY & CO.LTD.

<u>VILLAGE/TOWN</u>	<u>DAY</u>	<u>DISTANCE</u>	<u>DIRECTION</u>	<u>COST</u>
ELTISLEY				
BASSINGBOURN				
MELBOURN				
BARTON				
REACH				
HADDENHAM				
PETERBOROUGH*				
BISHOPS STORTFORD*				
BEDFORD*				
BURY ST. EDMUNDS*				
THETFORD*				

If the van costs 6p per mile to send, this must cover the cost of servicing, petrol and the wage of the driver and his mate. How much would it cost to travel to the five places marked *? (You may need an atlas or an A.A. book for these distances.)

The store can cut down this cost by planning the journeys of the van carefully - why do the vans only deliver to certain places on certain days?

Here is a list of the villages to which Robert Sayle & Co. Ltd., deliver to on Tuesday:

BARKWAY	FOWLMERE	HIGHFIELDS	
BARLEY	FOXTON	ICKLETON	PAMPISFORD
BARRINGTON	GT. CHISHILL	KELSHALL	REED
BASSINGBOURN	GUILDEN MORDEN	KNEESWORTH	ROYSTON
CALDECOTE	HARDWICK	LITTLINGTON	SAWSTON
COMBERTON	HARSTON	LITTLE CHISHILL	SHEPRETH
DRY DRAYTON	HASLINGFIELD	MELBOURN	THERFIELD
DUXFORD	HAUXTON	MELDRETH	THRIPILOW
EIMDON	HEYDON	MILL END	TOFT

1. What do you notice about these villages/towns?
2. Work out the best route for the drivers to take assuming that you have two vans to deliver to these villages and remembering that the shorter the route the cheaper is the journey and that deliveries may be made on the way to the furthest place and on the way back.

3. From what you know already about shops and shopping which villages in this list do you think would have most deliveries made to them?
 4. Why do you think it is important to pack the van carefully and work out the route before you do so?
 5. Which types of goods do you think are delivered most often?
- b. The size of shop in the centre of Cambridge - could either be paced in a similar way to the local shops or measured from an Ordnance Survey map 1:1250 of the shopping centre.
 - c. The number of people passing the shops could be counted in the same way. A more ambitious scheme would be to take a census of pedestrians at strategic points around the centre of the city - a contour map of the results may well reveal a 'high' point in the centre - the map may also reveal anomalies - i.e. one side of a street with many more pedestrians than the other; streets next to each other having vastly different numbers.

The whole may be summarized by simply comparing the results obtained in the two areas or by discussing the siting of a particular type of shop, e.g. grocer's shop - whether to open it in the city centre or in the local centre or somewhere else in the city giving reasons and taking into consideration such factors as:

- the proximity of residential areas;
- the proximity of other grocers - possible competition;
- bus routes;
- factory areas (lunch time shopping);
- access for cars;
- proximity of other shops (people may be likely to come to the shop if they can visit others in the same journey).

A map of the proposed area (the local area for instance as used already) could be used to plot possible sites.

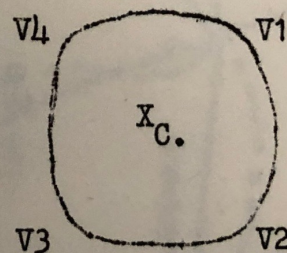
The city of Cambridge and the area surrounding it are connected in a number of ways - people from the countryside come into the city to work, so providing labour for the city's industries; people also come in to shop, and for certain forms of entertainment - e.g. football, cinema, theatre. Just as the people living in the countryside depend on the city, so the city also depends on the countryside - for workers in factories, as we have already mentioned, but also for such things as fresh food (look where the stalls on the market come from next time you are there).

There are various ways of trying to measure the area which supplies Cambridge and the area of countryside which is dependent upon Cambridge. One way, used here, is to measure the area served by the local newspaper, because the Cambridge Evening News will only be sold in areas where people are interested in Cambridge and want to know what is happening there. People in Norwich or Ipswich will hardly want to buy the Cambridge Evening News but rather the Norwich or Ipswich Evening News.

What to do:

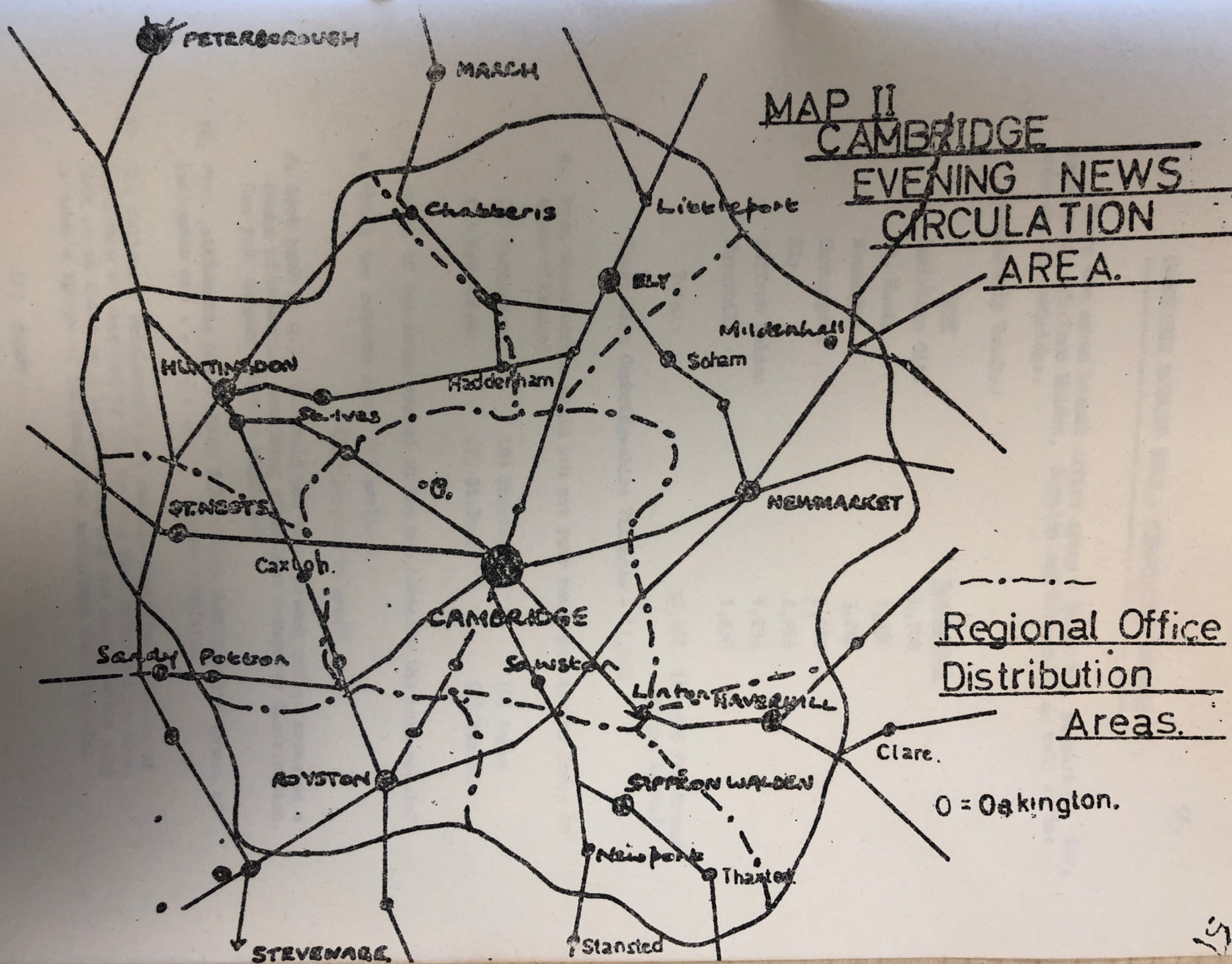
1. You will have been placed in a small group of four or five people and given a section of a recent Cambridge Evening News.
2. Search through your section of the newspaper, noting down on a piece of rough paper all places (cities, towns, villages) which are mentioned.
3. As a class, make a master-list of all the places mentioned.
4. As a class, decide whether it is reasonable to expect the Evening News to be sold in all the places you have listed. Note down any places that you decide are outside the area served by the local newspaper.
5. Mark on the outline map all the towns and villages in your master-list. If necessary, use just a dot and the initial letter of the settlement, and draw up a key.
6. Draw a line around Cambridge so that all the settlements served by the newspaper are between the line and Cambridge itself - e.g.

Give your map a title.



7. The map you have drawn up is one way which can be used to measure the sphere of influence of Cambridge - the area around it on which Cambridge has a considerable influence.
8. Now look at the second map you have been given. This is a map drawn up by the Cambridge Evening News, showing the area to which they distribute the newspaper. Describe how it differs from the map you have drawn up.
9. The map also shows the seven branch office areas. These offices distribute the newspaper daily in their areas - the details are as follows:

MAP II
CAMBRIDGE
EVENING NEWS
CIRCULATION
AREA.



CAMBRIDGE EVENING NEWS - CIRCULATION DETAILS

There are seven branch office areas - St. Neots, Newmarket, Ely, Huntingdon, Saffron Walden, Royston and Haverhill, as well as the main one in Cambridge.

Readership Totals:

<u>Area</u>	<u>Readership</u>
Cambridge City	24,700
St. Neots	1,350
Newmarket	3,265
Huntingdon	2,181
Ely	2,956
Saffron Walden	1,234
Haverhill	1,130
Total:	38,656 (13,956 for Branch Office Areas)

Inner Ring Cambridgeshire Villages - 11,500

a. From which office would you get your newspaper if you lived in these villages?

(A) Oakington

(B) Thaxted

(C) Soham

(D) Haddenham

(E) St. Ives

(F) Caxton

b. Which of the areas marked on the map contains the most people?

c. Which two regions are: (i) smallest

(ii) largest in area?

d. Look back at Q.7 - we could use these branch office areas as a means of measuring something other than newspaper distribution. Can you suggest what it might be?

10. "The settlements named which fall within Huntingdon's sphere of influence are" Please complete.

11. The following settlements are outside Cambridge's sphere of influence as measured by the Evening News distribution area. Look at an atlas or a larger scale map and decide which city or town's sphere of influence the settlement falls within:

(i) Sandy

(ii) March

(iii) Clare

(iv) Stansted